

The WISC-V : Use and interpretation

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Overview

1. Overview of the WISC-V
2. The subtests
3. The factors
4. Interpreting the WISC-V
5. Diagnosing developmental cognitive disorders

WISC versions

WISC	1949
WISC-R	1974
WISC-III	1991
WISC-IV	2004
WISC-V	2016



David Wechsler

Wechsler

developed battery comprised of tasks from Binet and the army tests

in 1936, published Wechsler-Bellevue Intelligence Scale

rejected reliance on *g*

emphasised two broad aspects of intelligence: verbal and performance

utilised standardised scores: deviation IQs

later revisions titled “Wechsler Adult Intelligence Scale” (WAIS) and “Wechsler Intelligence Scale for Children” (WISC), now in fourth and fifth editions

The main changes

Subtests

10 primary subtests

- FSIQ and the five primary index scores

6 secondary subtests

- ancillary and expanded index scores
- substitute for a primary subtest in calculation of FSIQ if administration is spoiled

5 complementary subtests

- only on Q-interactive administration

Omitted subtests

Word Reasoning

Picture Completion

New subtests

Figure Weights

Visual Puzzles

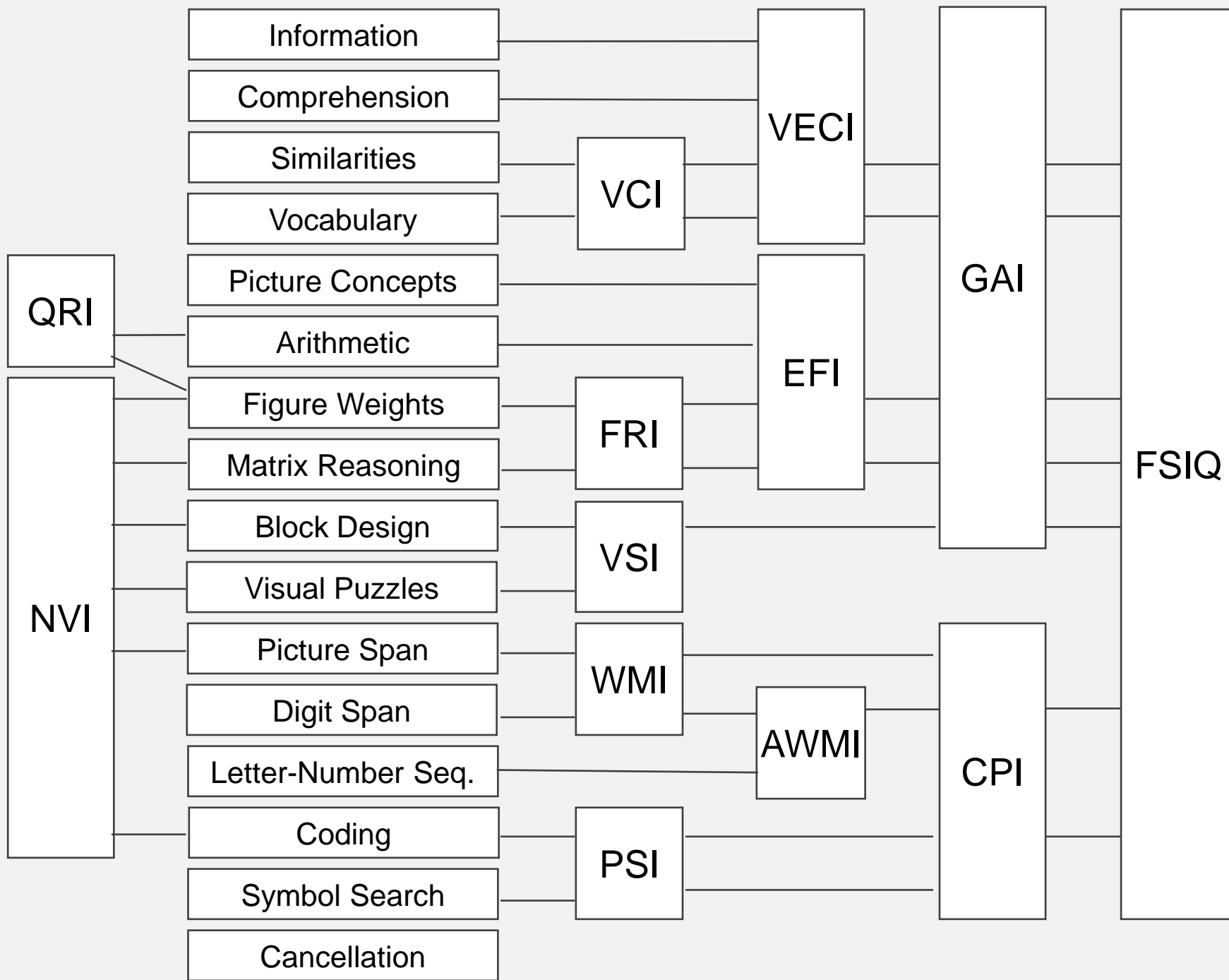
Picture Span

New factors

five primary factors

five ancillary factors

two extended factors



A&NZ Standardisation

Sample

528 participants from Australia (N=444) and New Zealand (N=84)

matched for

- age
- gender
- parent education
- state/territory
- ancestry/ethnicity

Reliability

SI	.88	BD	.84	PC	.83	LN	.90
VC	.87	VP	.90	AR	.90	CD*	.83
IN	.86	MR	.86	DS	.92	SS*	.74
CO	.84	FW	.95	PS	.89	CA*	.78

* stability coefficient

Reliability

FSIQ	.96	GAI	.95			VECI	.95	EFI	.95
VCI	.92	VSI	.91	FRI	.93	WMI	.94	PSI	.86
		NVI	.96	QRI	.95	AWMI	.95	CPI	.93

Test-retest reliability

SI	.63	BD	.78	PC	.49	LN	.81
VC	.87	VP	.74	AR	.76	CD	.83
IN	.90	MR	.68	DS	.87	SS	.74
CO	.63	FW	.66	PS	.69	CA	.78

The subtests

Block Design

13 items (6 new)

more complex designs

time bonuses for last 4 items

optional process scores

Digit Span

additional 10-digit DF item to improve ceiling

additional 3-digit DB item to improve gradient of
scores

new sequencing task

Coding

changed symbols

item difficulty made consistent across rows

Vocabulary

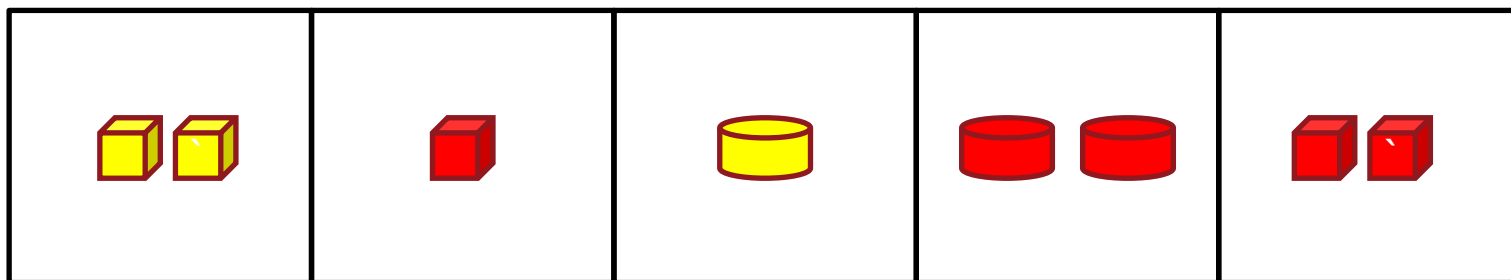
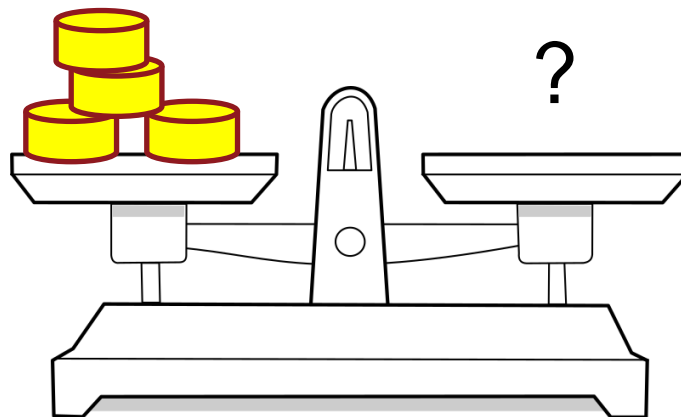
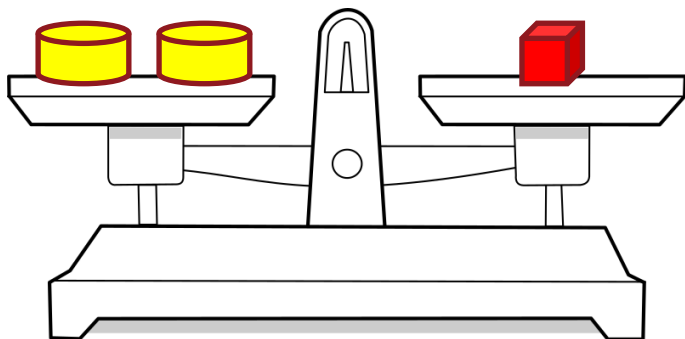
29 items (down from 36)

- 13 new items
- Words removed

Figure Weights

the child views a scale with missing weights and
selects the response option that keeps the scale
balanced

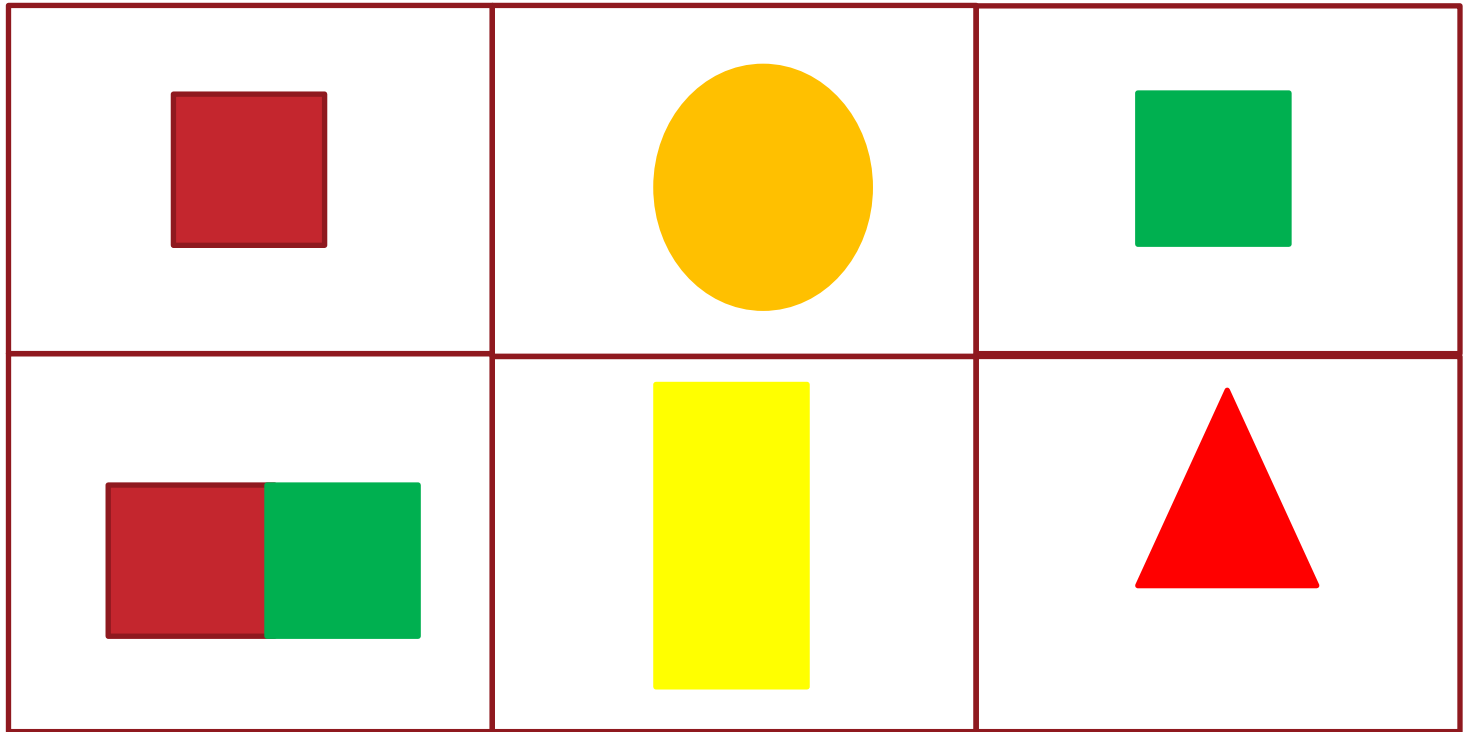
time limit 20 or 30 seconds



Visual Puzzles

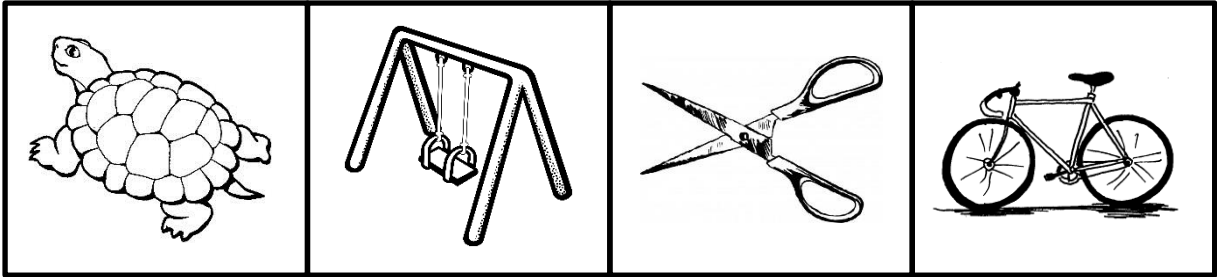
the child views a completed puzzle and selects
three response options that when combined
reconstruct the puzzle

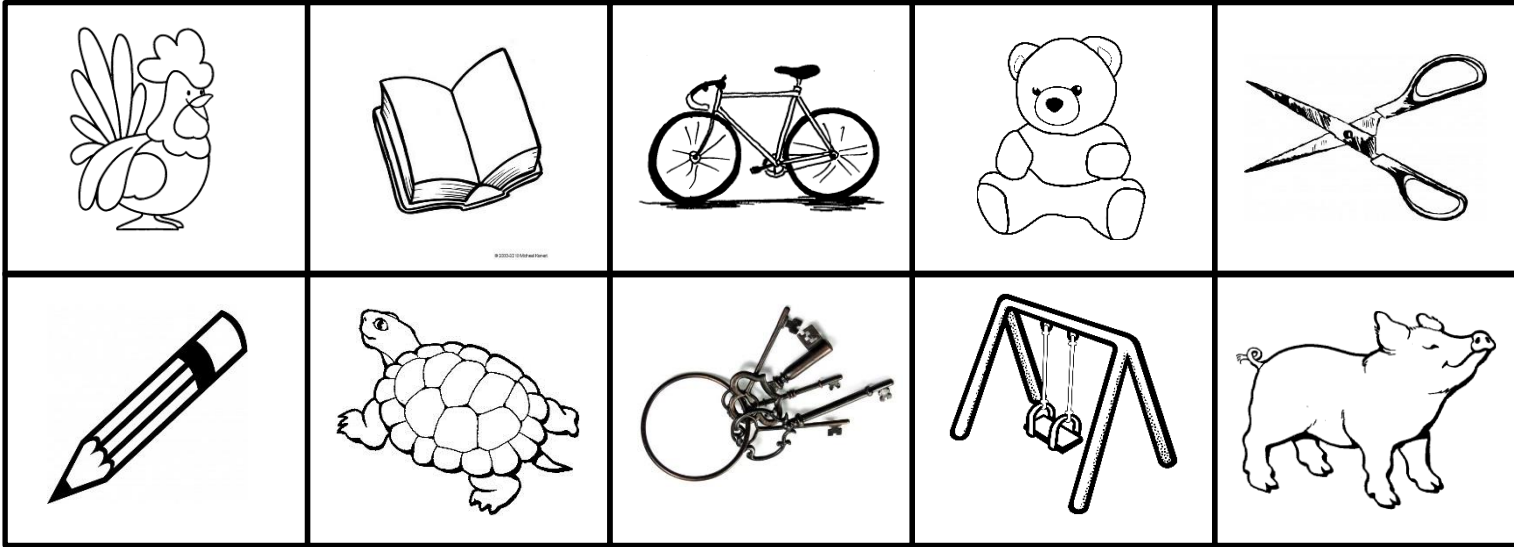
time limit 30 seconds



Picture Span

the child views a stimulus page of 1-8 target pictures, then selects (in order) these pictures from a larger array





Symbol Search

new symbols

optional error scores

Picture Concepts

27 items (down from 28)
pictures appear only once

Letter-Number Sequencing

10 items

items with rhyming phonemes modified

new instructions to improve floor



The factors

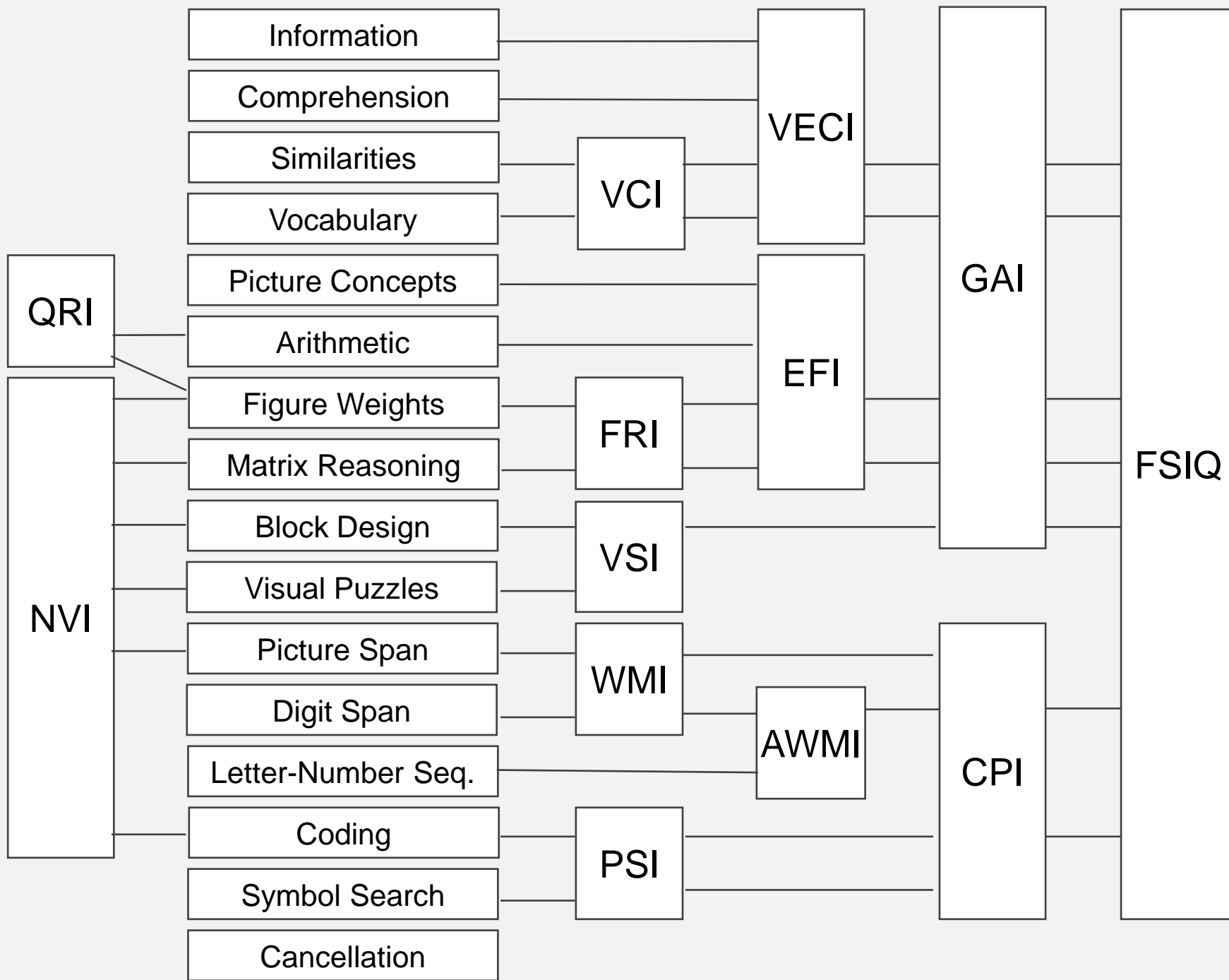
Index scores

Full Scale IQ

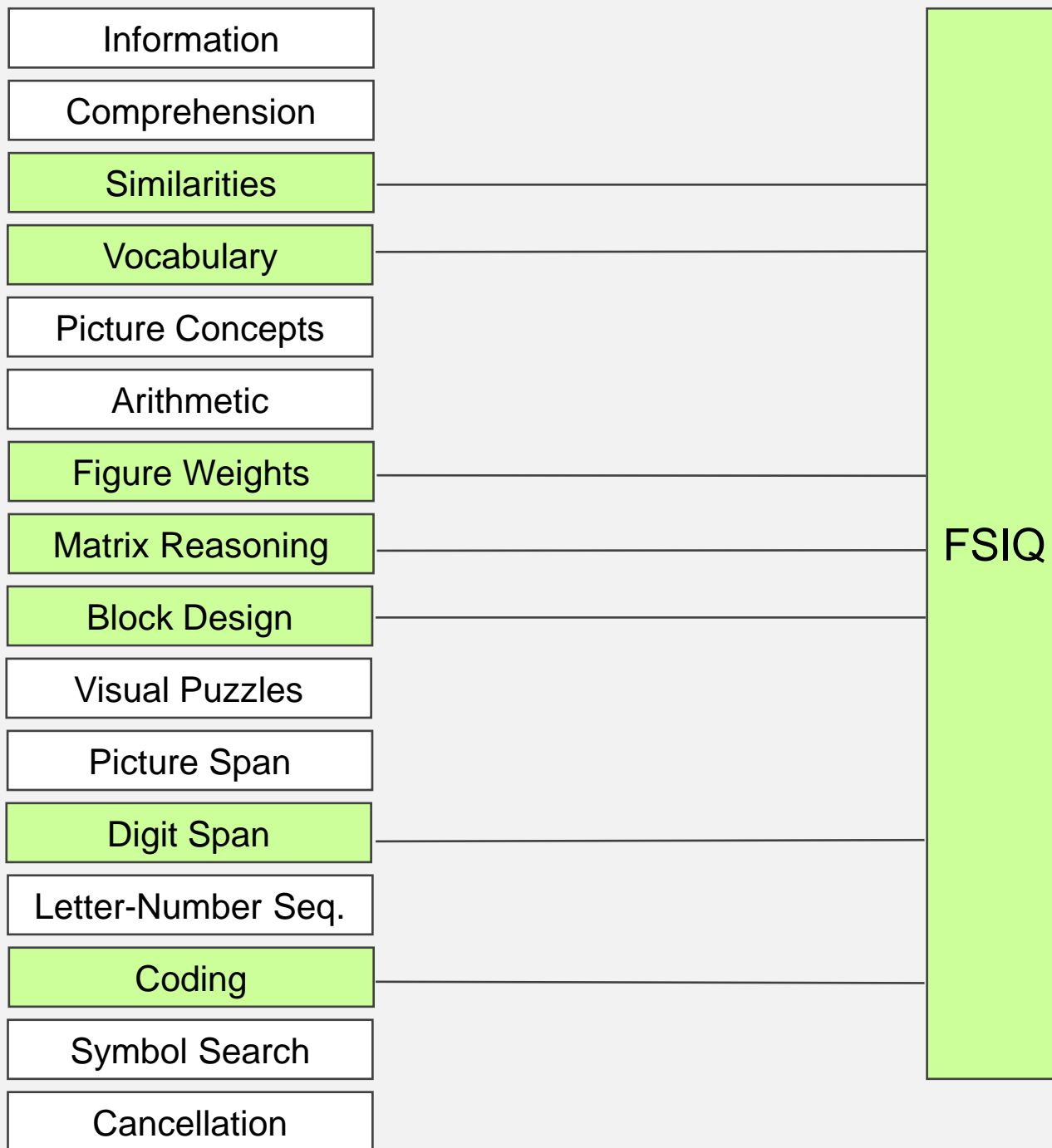
five primary factors

five ancillary factors

two extended factors



Full Scale IQ



Calculating FSIQ

calculated from seven subtests

child must obtain non-zero raw scores on at least three subtests

if only six subtests scores available, may prorate to calculate FSIQ

if a primary subtest is spoiled, may substitute a subtest from list (only once)

Allowable substitutions for FSIQ

FSIQ subtest	Allowable substitute
Similarities	Information or Comprehension
Vocabulary	Information or Comprehension
Block Design	Visual Puzzles
Matrix Reasoning	Picture Concepts
Figure Weights	Picture Concepts or Arithmetic
Digit Span	Picture Span or Letter-Number Sequencing
Coding	Symbol Search or Cancellation

FSIQ

“The FSIQ is usually considered the score that is the most representative of general intellectual functioning (g).”

Technical Manual, p.157

Intelligence

“the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment”

Wechsler (1958)

“the ability to plan and structure one’s behavior with an end in view”

Das (1973)

“mental activity involved in purposive adaptation to, shaping of, and selection of real-world environments relevant to one’s life”

Sternberg (1986)

“Intelligence is not an entity within the organism but a quality of behavior. Intelligent behavior is essentially adaptive, insofar as it represents effective ways of meeting the demands of a changing environment. Such behavior varies with the species and with the context in which the individual lives”

Anastasi (1986)

“Intelligent behaviour reflects the survival skills of the species, beyond those associated with basic physiological processes”

Sattler (2001)

“IQ represents the degree to which, and the rate at which, people are able to learn, and retain in long-term memory, the knowledge and skills that can be learned from the environment (that is, what is taught in the home and in school, as well as things learned from everyday experience)”

Carroll (1997)

“psychologists are incapable of reaching a consensus on its definition. It has proved to be a hopeless quest...the word “intelligence” has come to mean too many different things to many people (including psychologists). It has become so fraught with value judgements, emotions, and prejudices as to render it useless to scientific discussion.”

Jensen (1998, p.48)

General intelligence: the dilemma

IQ as a “global” indicator of abilities

- inclusion of subtests that represent breadth of activities
- NB: “Full Scale” was defined by Wechsler as summation of all subtests

IQ as measure of g

- selection of subtests that load highest on g

FSIQ is not a full scale score

“The WISC-V FSIQ does not in fact represent a full scale. It is not based on the summing of all 21 of the subtests included in the test; nor the 16 subtests excluding the five complementary tasks that are identified in the manual as “not measures of intelligence” nor even the 10 subtests that compose the five primary indexes. Rather, the FSIQ is a truncated estimate based on seven equally-weighted subtests”

McCloskey (2016), p.672

FSIQ

the FSIQ is one possible estimate of intellectual abilities

- other options include GAI, NVI

the FSIQ is the best available estimate of broad, general intellectual abilities

a better estimate would have been provided by an index combining all the subtests

the best available estimate of g is GAI

Primary factors

Primary factors

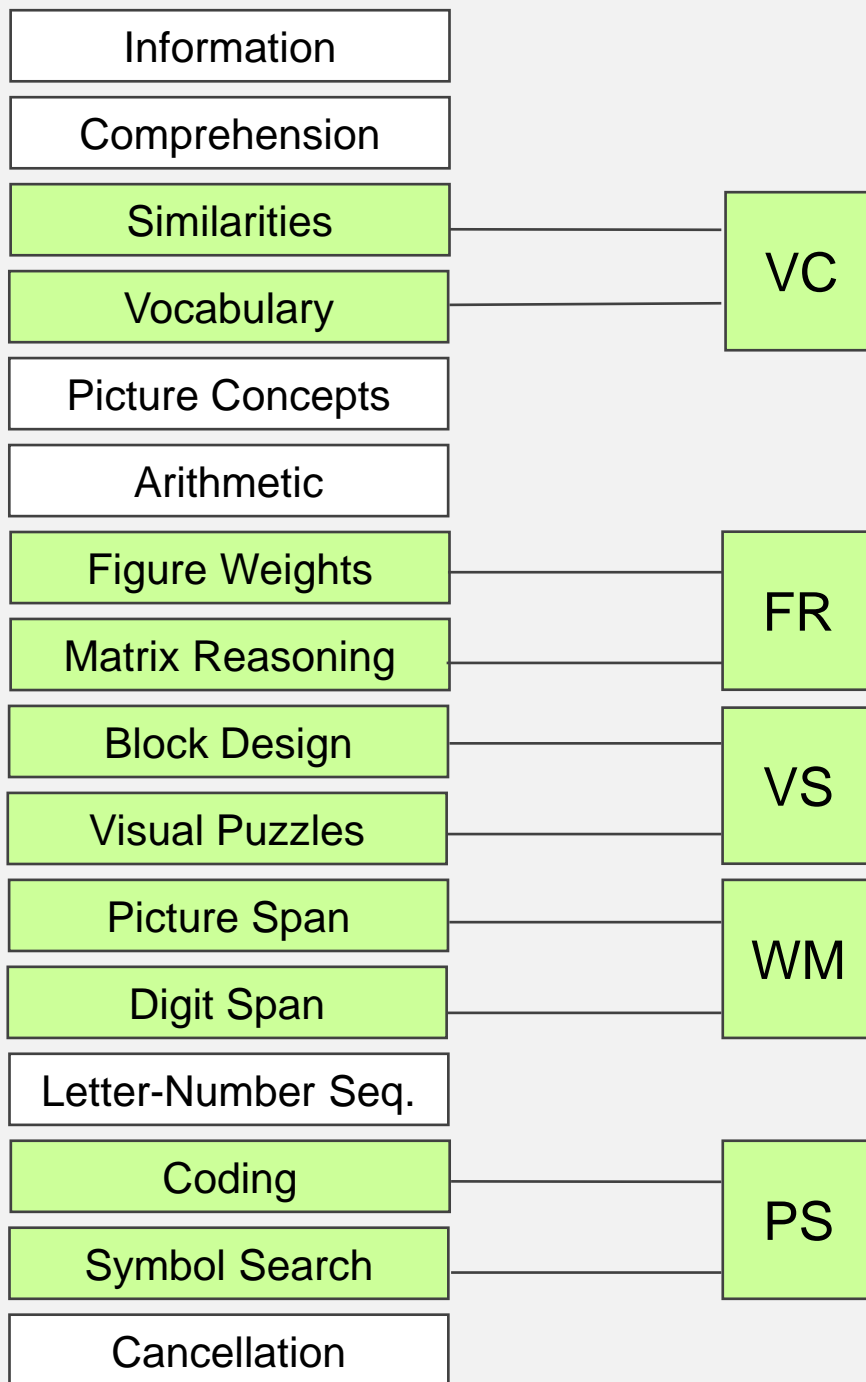
Verbal Comprehension

Visual Spatial

Fluid Reasoning

Working Memory

Processing Speed



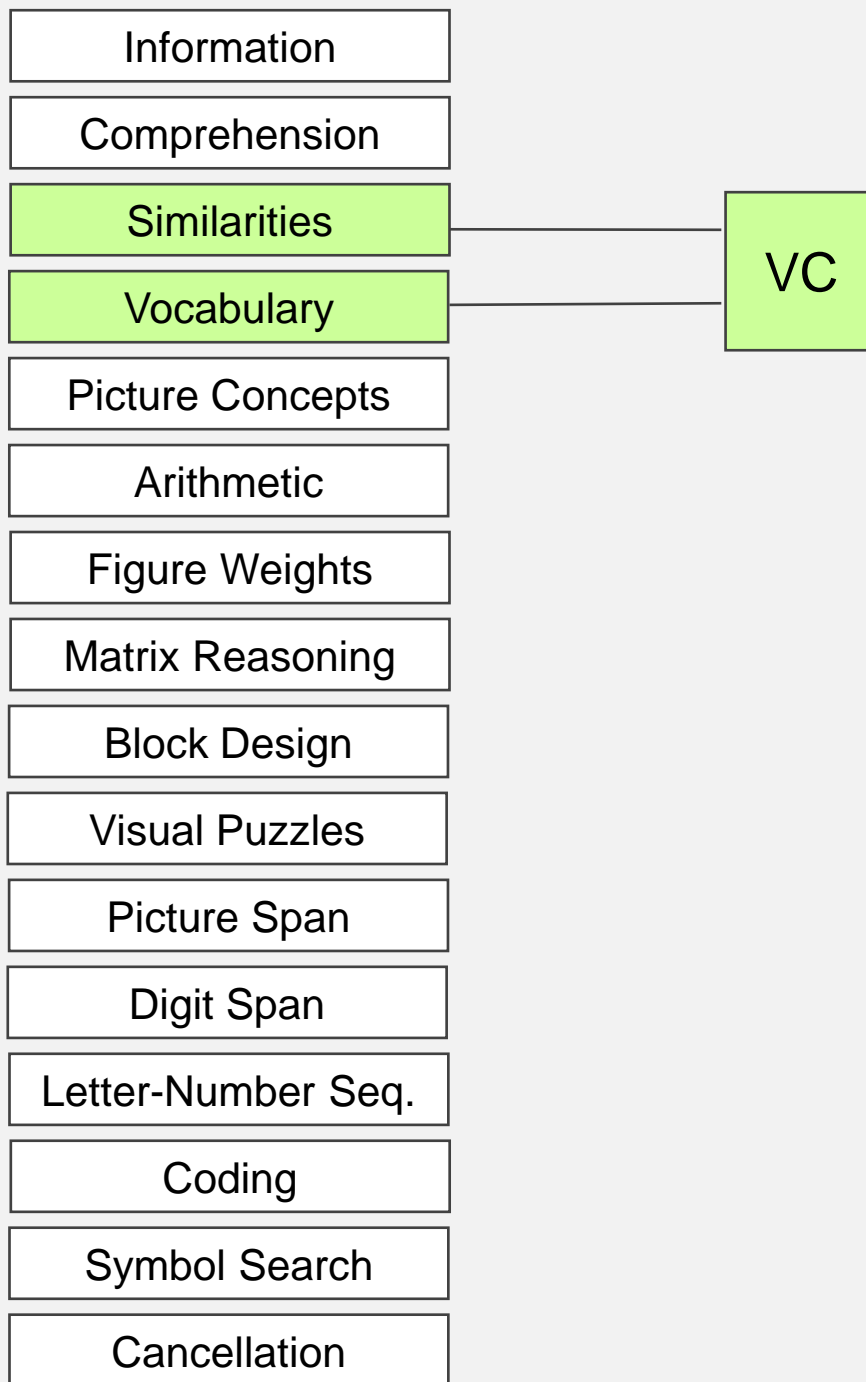
Calculating Primary Index Scores

each primary index score calculated from two primary subtests

to calculate a primary index score, child must obtain non-zero raw scores on at least one of the two subtests

prorating not permitted

if a subtest is spoiled, substitution not permitted



Verbal Comprehension Index

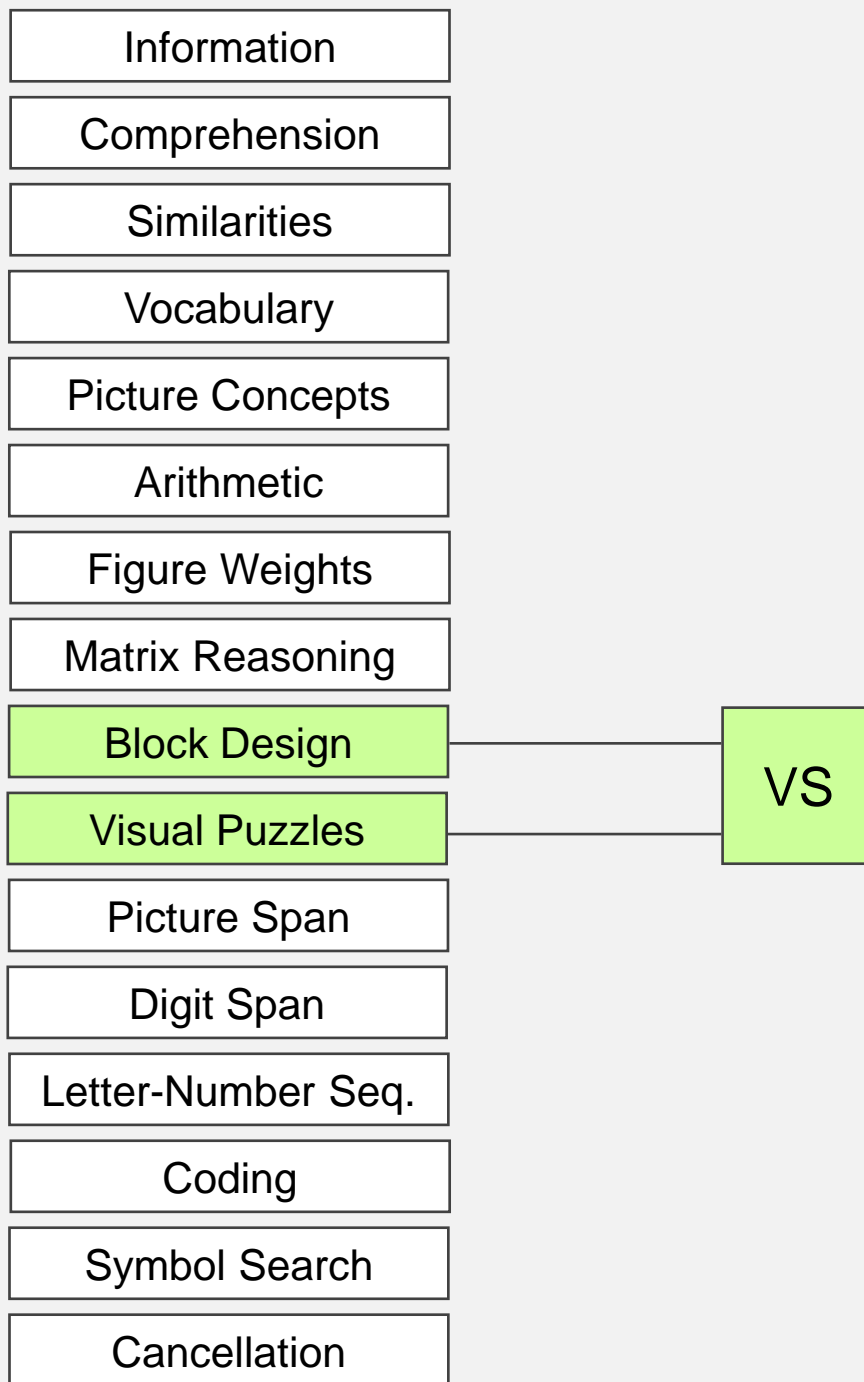
“The VCI measures the child’s ability to access and apply acquired word knowledge. The application of this knowledge involves verbal concept formation, reasoning, and expression.”

Technical Manual, p.157

Verbal Comprehension

“verbal reasoning”

- language
- executive functions



Visual Spatial Index

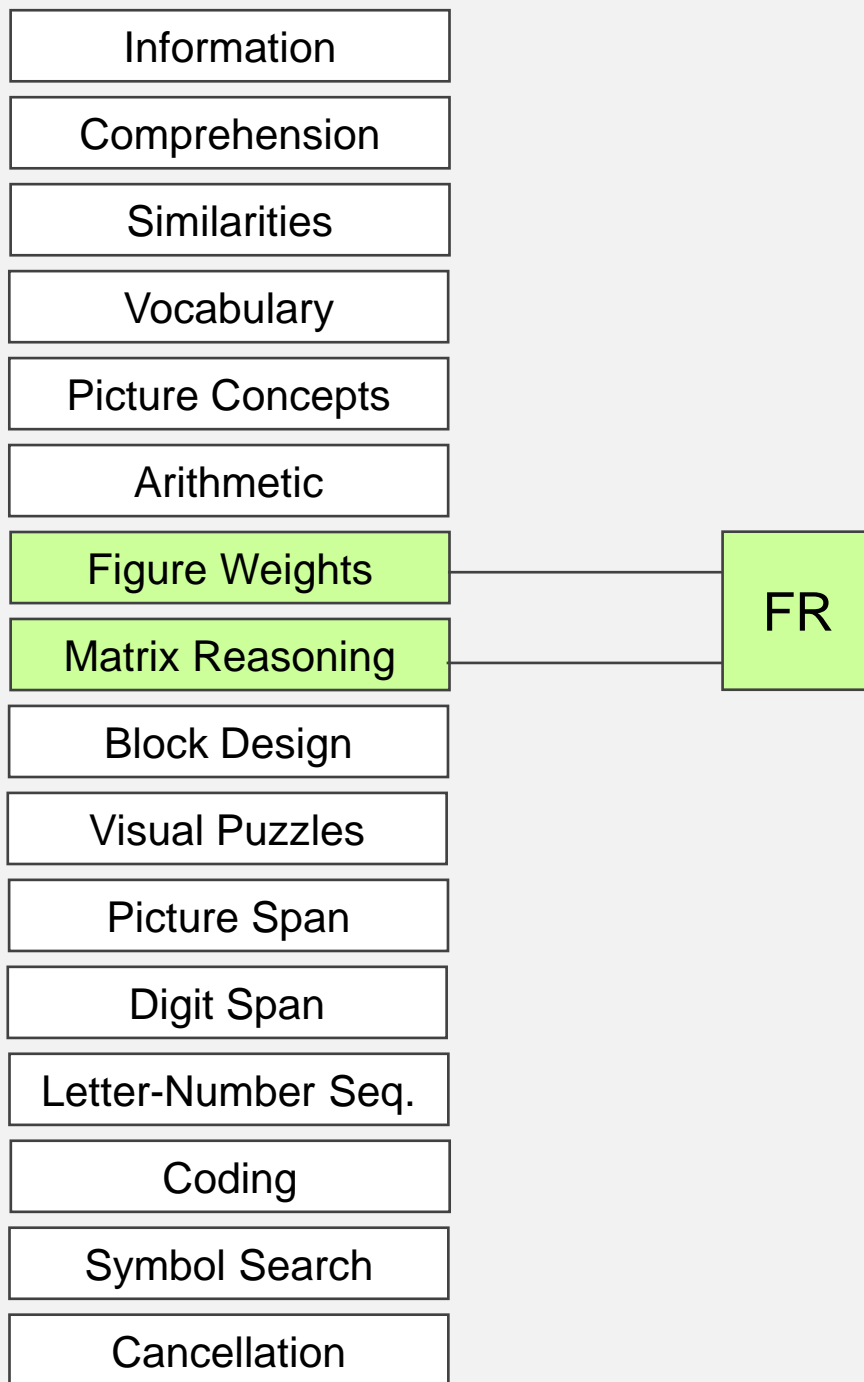
“The VSI measures the child’s ability to evaluate visual details and to understand visual spatial relationships to construct geometric designs from a model. The ability to construct designs requires visual spatial reasoning, integration and synthesis of part-whole relationships, attentiveness to visual detail, and visual-motor integration.”

Technical Manual, p.158

Visuo-spatial

“nonverbal skills”

- executive functions
- visual perception
- spatial abilities



Fluid Reasoning

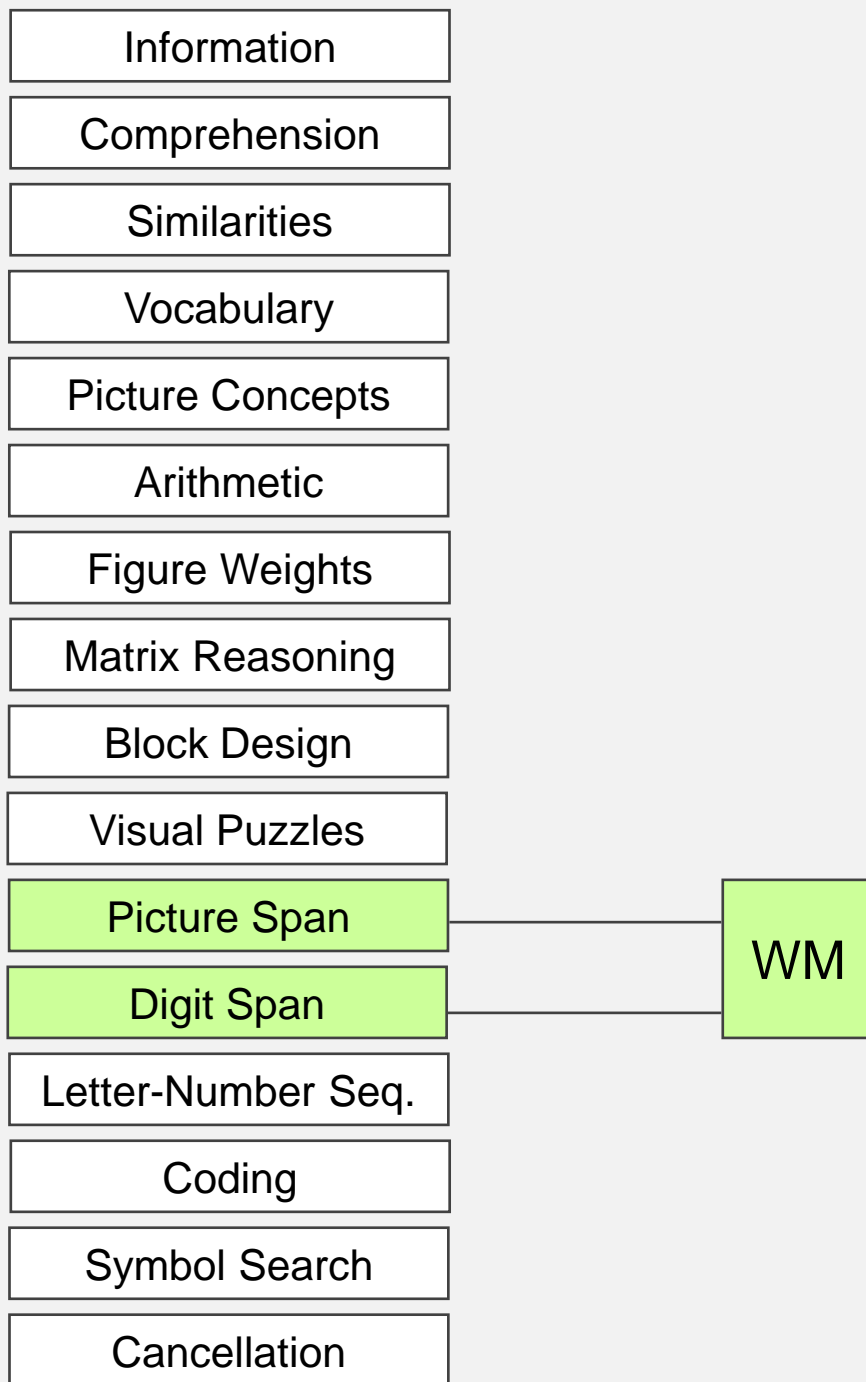
“The FRI measures the child’s ability to detect the underlying conceptual relationship among visual objects and to use reasoning to identify and apply rules. Identification and application of conceptual relationships in the FRI requires inductive and quantitative reasoning, broad visual intelligence, simultaneous processing, and abstract thinking.”

Technical Manual, p.158

Fluid Reasoning

“nonverbal reasoning”

- executive functions
- visual perception
- language



Working Memory

“The WMI measures the child’s ability to register, maintain, and manipulate visual and auditory information in conscious awareness. Registration requires attention, auditory and visual discrimination, and concentration. Maintenance is the process by which information is kept active in conscious awareness, using the phonological loop or visual sketchpad ... Manipulation is mental resequencing of information based on the application of a specific rule.”

Technical Manual, p.159

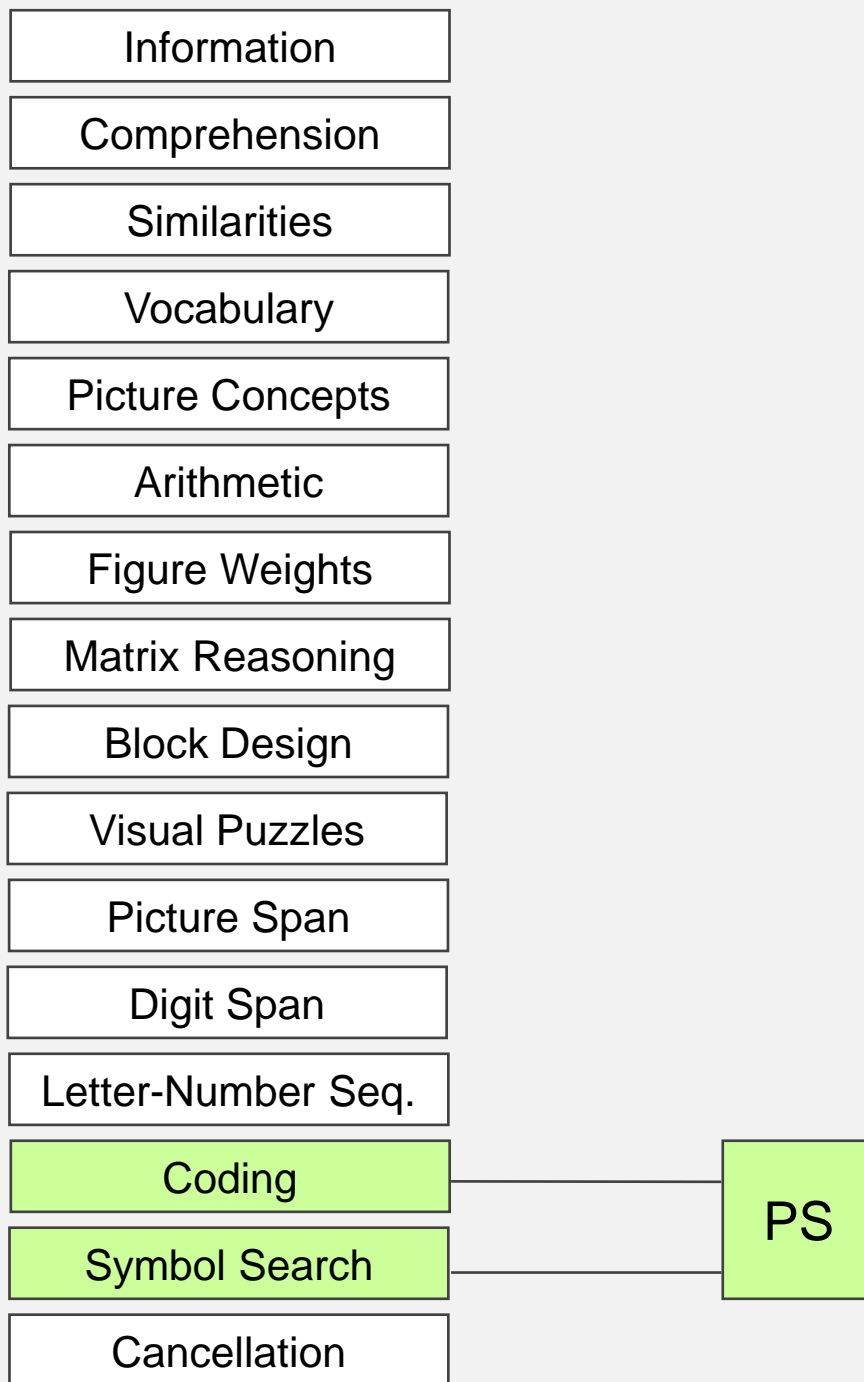
Working Memory

verbal working memory (phonological loop)

- phonology

nonverbal working memory (visuospatial sketchpad)

executive



Processing Speed

“The PSI measures the child’s speed and accuracy of visual identification, decision making, and decision implementation. Performance on PSI is related to visual scanning, visual discrimination, short-term visual memory, visuomotor coordination, and concentration”

Technical Manual, p.159

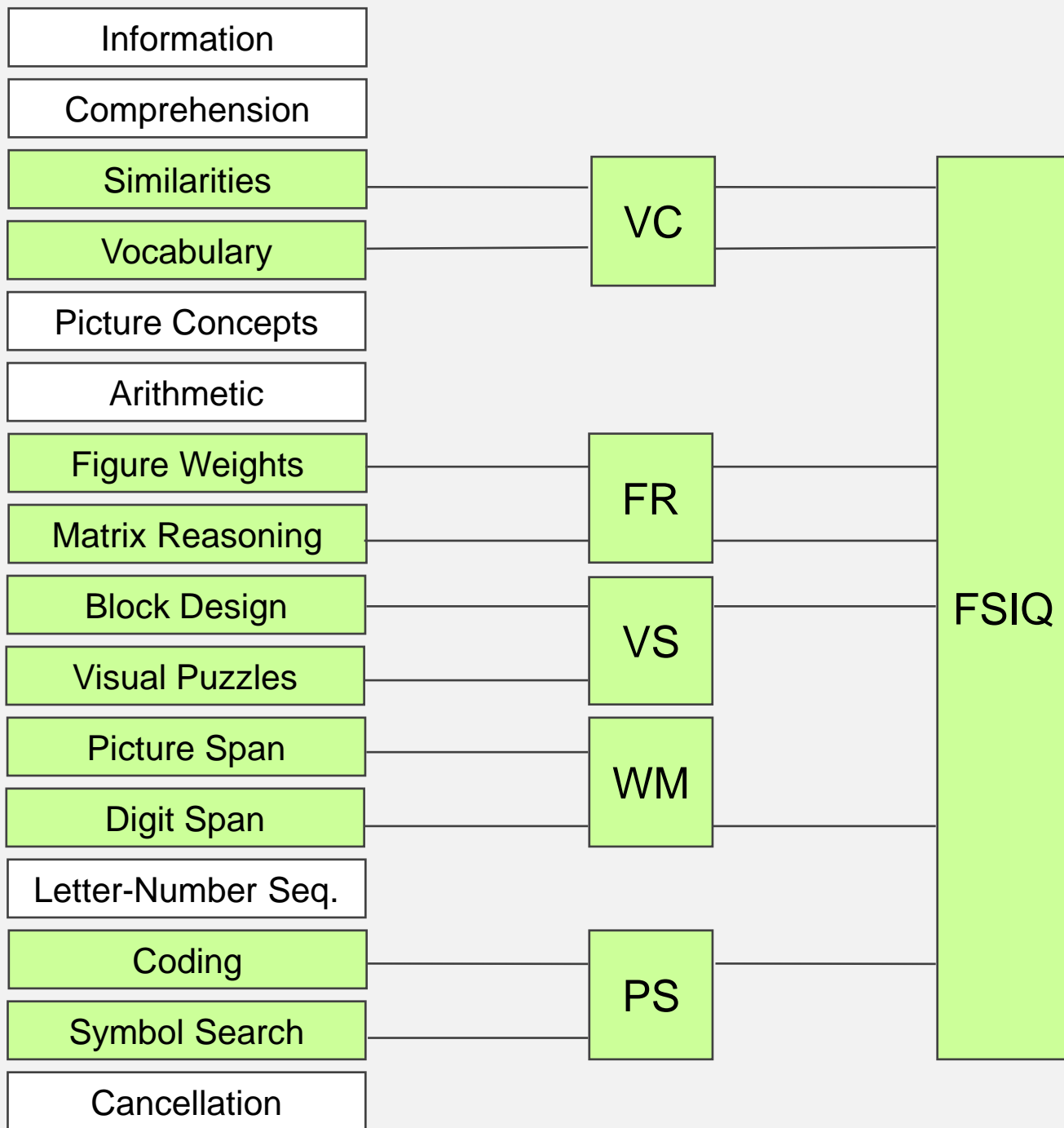
Processing Speed

visuo-motor speed

- visual perception
- motor skills

orthographic skills

- phonology



The factor controversy

*On how many factors do the
WISC-V subtests load?*

Factor analytic methods

exploratory factor analysis

- is employed to uncover the underlying structure of a set of observed variables without imposing a preconceived structure on the outcome

confirmatory factor analysis

- is employed to test hypotheses about the factor structure of a set of observed variables

WISC-V CFA

“...confirmatory factor analysis is different from exploratory factor analysis, because the subtests are sorted into groups representing different factors in advance rather than the groups being generated by applying a statistical algorithm to the data. The prespecified model is tested to determine if it provides a reasonably good, yet parsimonious, explanation of the actual correlations among the subtests.”

Technical Manual, p.77

“...the technique of confirmatory factor analysis is preferred to exploratory factor analysis when an explicit theory of the factor structure is present or when there are competing models in the research literature”

Technical Manual, p.77

CFA results

five factors

“new” factors named VS and FR

FSIQ and FR correlate 1.00

EFA

EFA of the US standardisation sample produced
four factors: VC, PR, WM, PS

Canivez and Watkins (2015)

“Had the publisher examined results from EFA or seriously considered the practical and theoretical issues created by the 1.00 loading of Fluid Reasoning on general intelligence in CFA, it would have been apparent that there were significant problems for separate Visual Spatial and Fluid Reasoning factors, given the available 16 WISC-V subtests”

Canivez & Watkins (2016) p. 701

Opinion

little evidence that VS and FR represent distinct factors ($r = .91$ Aus)

no evidence at all that they differentially assess visuospatial and executive skills

Ancillary factors

Ancillary Index Scales

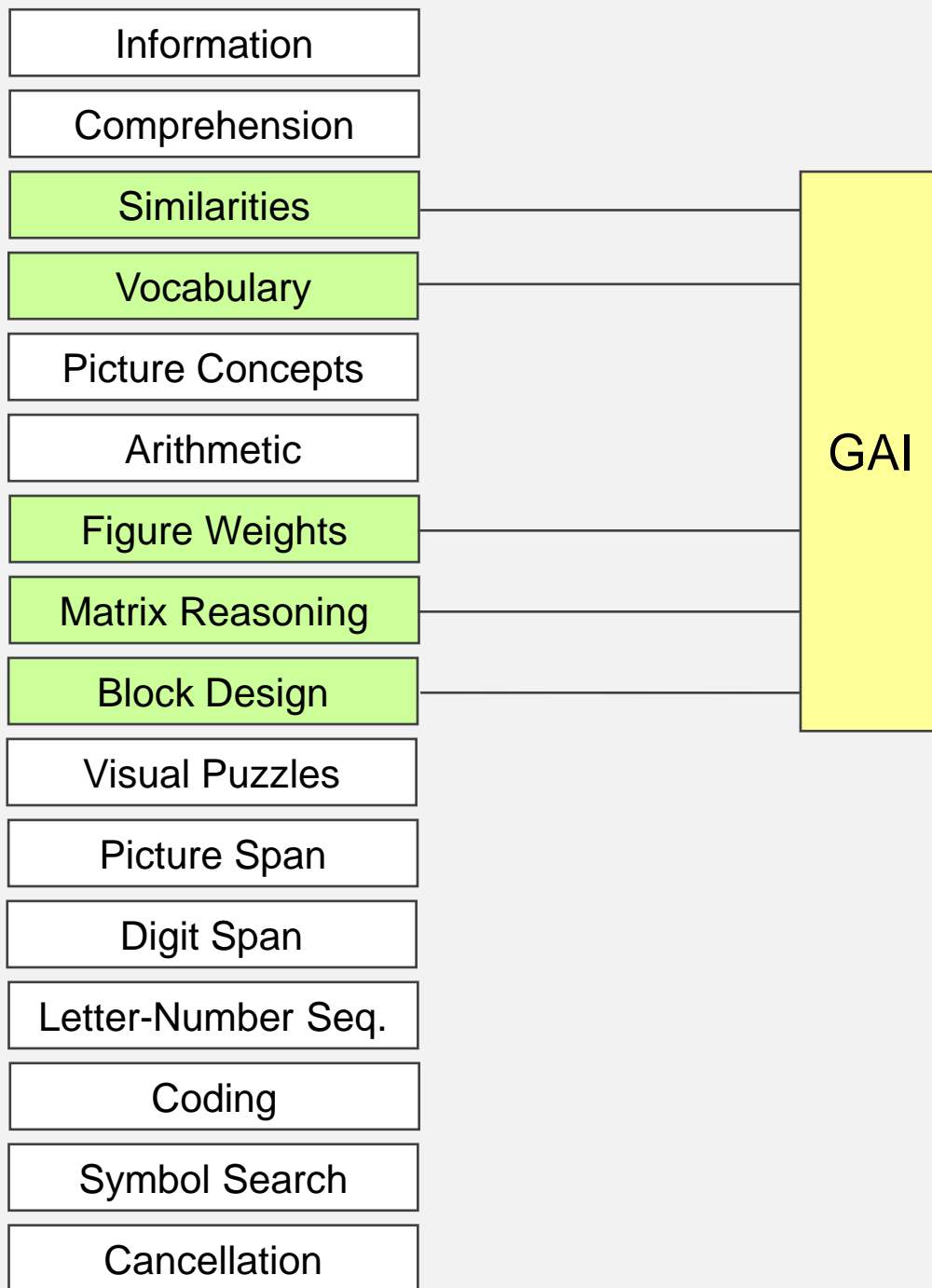
General Ability Index (GAI)

Cognitive Proficiency Index (CPI)

Auditory Working Memory Index (AWMI)

Quantitative Reasoning Index (QRI)

Nonverbal Index (NVI)



GAI

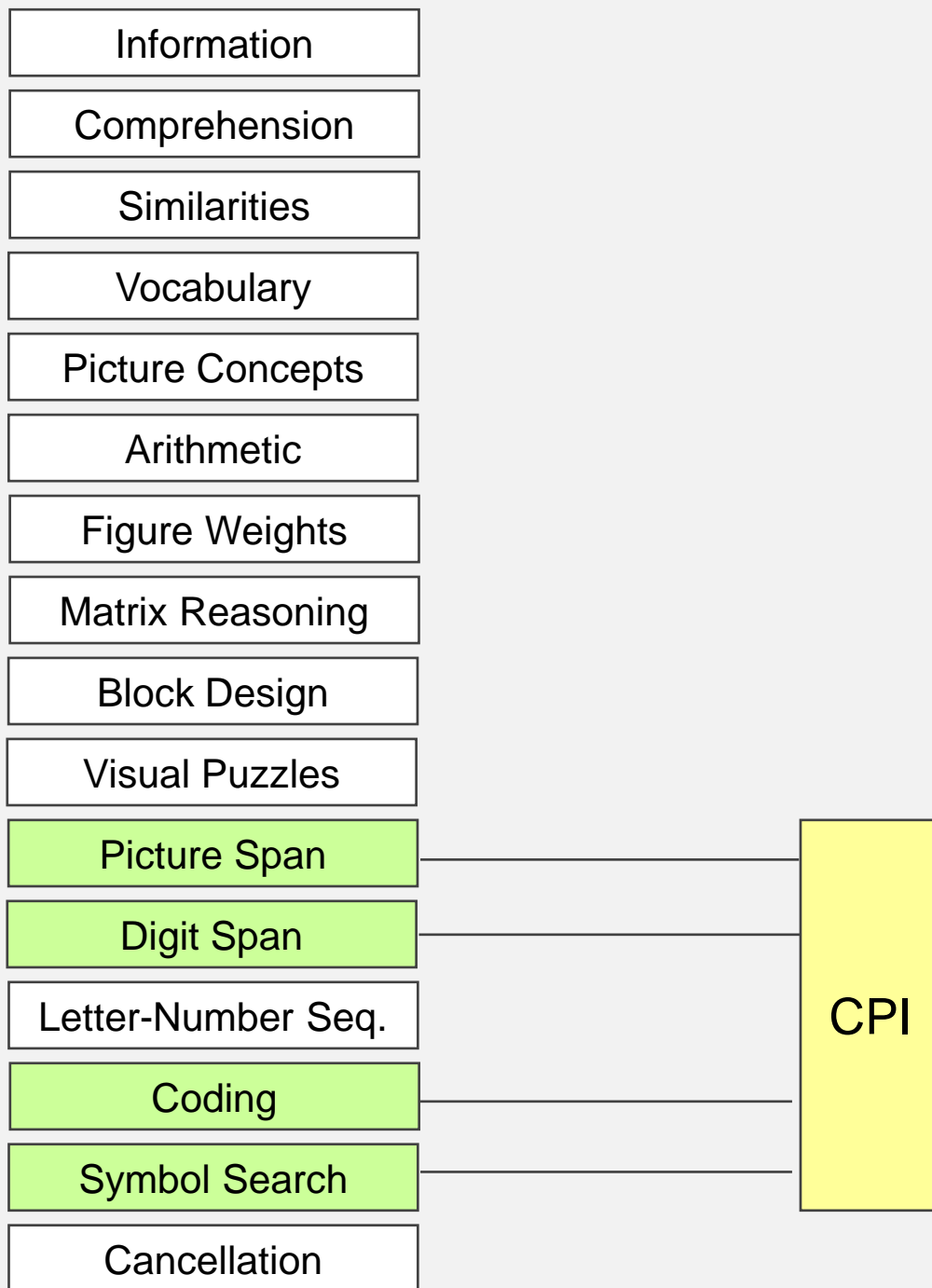
“the GAI provides an estimate of general intellectual ability that is less reliant on working memory and processing speed relative to the FSIQ”

Technical Manual, p.167

GAI

a six-subtest GAI was first introduced on WISC-IV
as a better measure of *g* than the ten-subtest
FSIQ

on WISC-V, five-subtest GAI is likely to be a better
measure of *g* than the seven-subtest FSIQ



Cognitive Proficiency Index

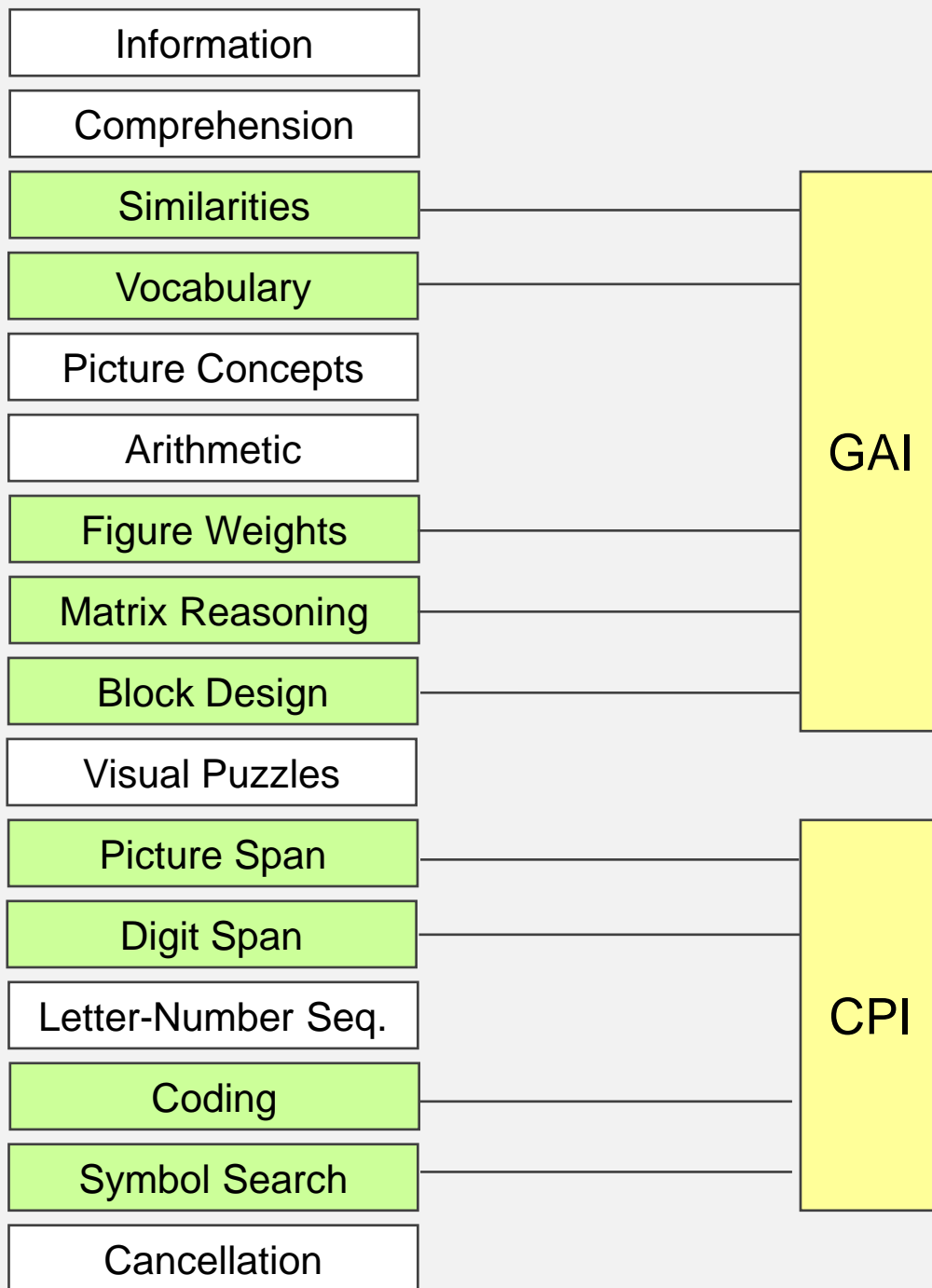
“the CPI provides an estimate of the efficiency with which information is processed in the service of learning, problem solving and high order processing”

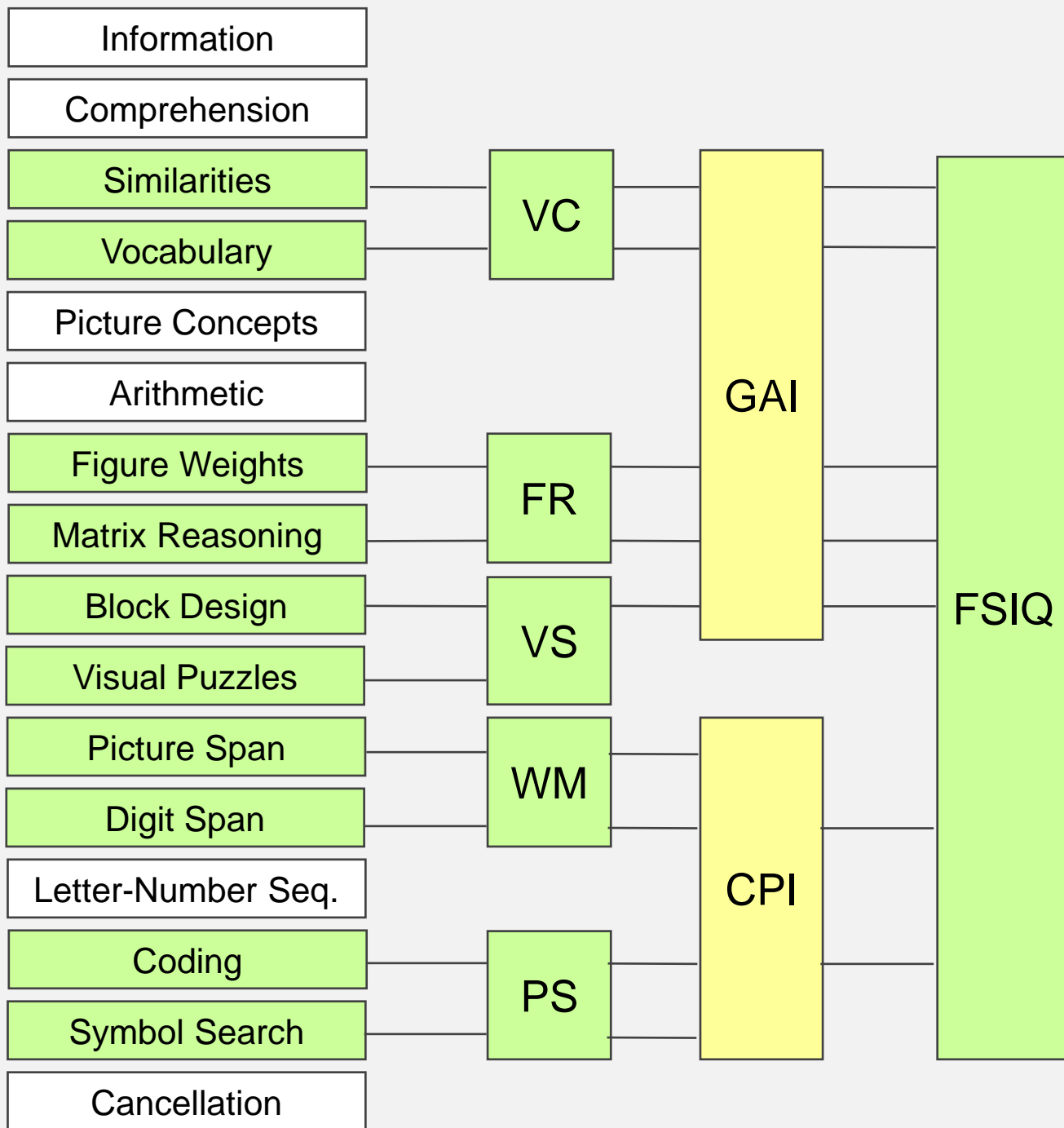
Technical Manual, p.168

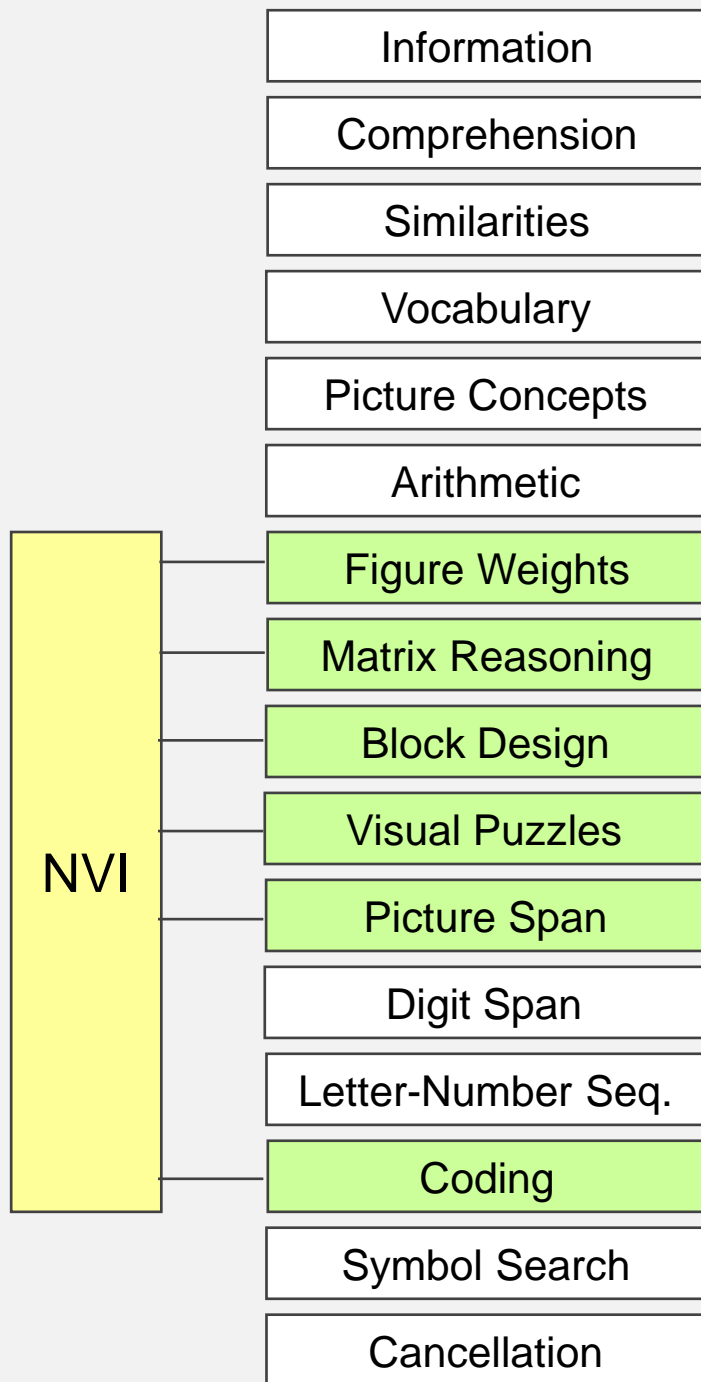
Cognitive Proficiency Index

a measure of specific working memory abilities and skills involved in literacy

- verbal working memory / phonology
- visuospatial working memory
- orthography







Nonverbal Index

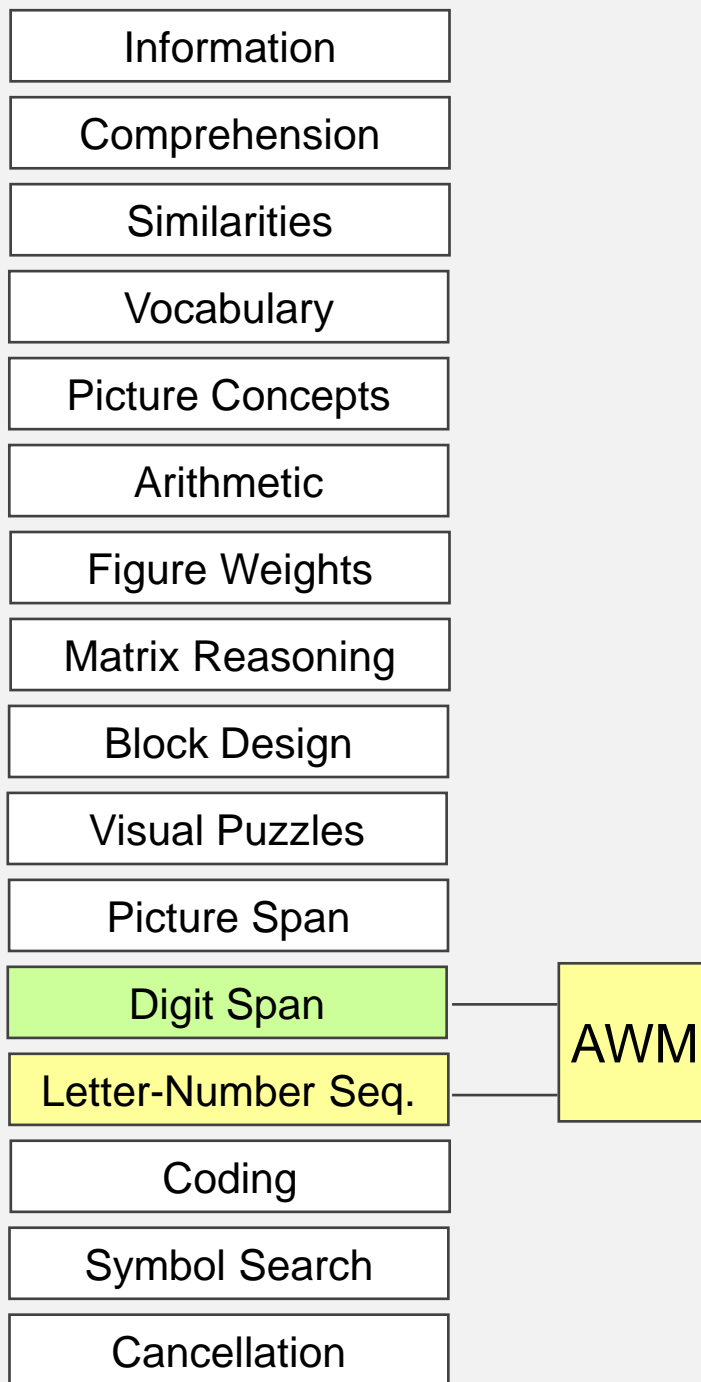
“The NVI can be interpreted as a measure of general intellectual ability that minimizes expressive demands for children with special circumstances (e.g., English language learners) or clinical needs (e.g., autism spectrum disorder with language impairment). The lack of expressive demands may also make the NVI a useful estimate of overall cognitive ability for some children who are deaf or hard of hearing.”

Technical Manual, p.166

Nonverbal Index

a general measure of intelligence with reduced
language content

exclusion of Symbol Search?



Auditory Working Memory Index

“Whereas the WMI provides a composite measure of working memory across mixed modalities (auditory and visual), the AWMI provides a purer measure of auditory working memory”

Technical Manual, p.165

Auditory Working Memory

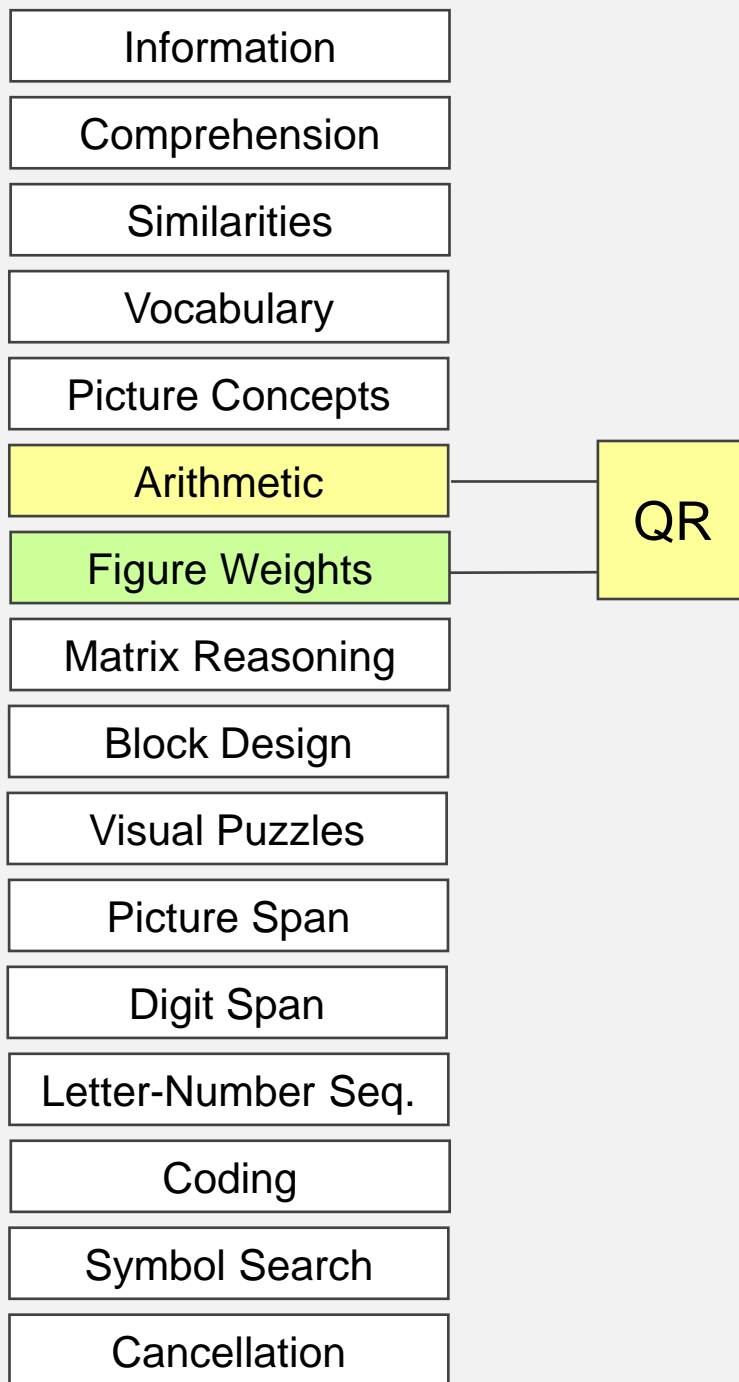
as for WISC-IV WM, a purer measure of verbal working memory

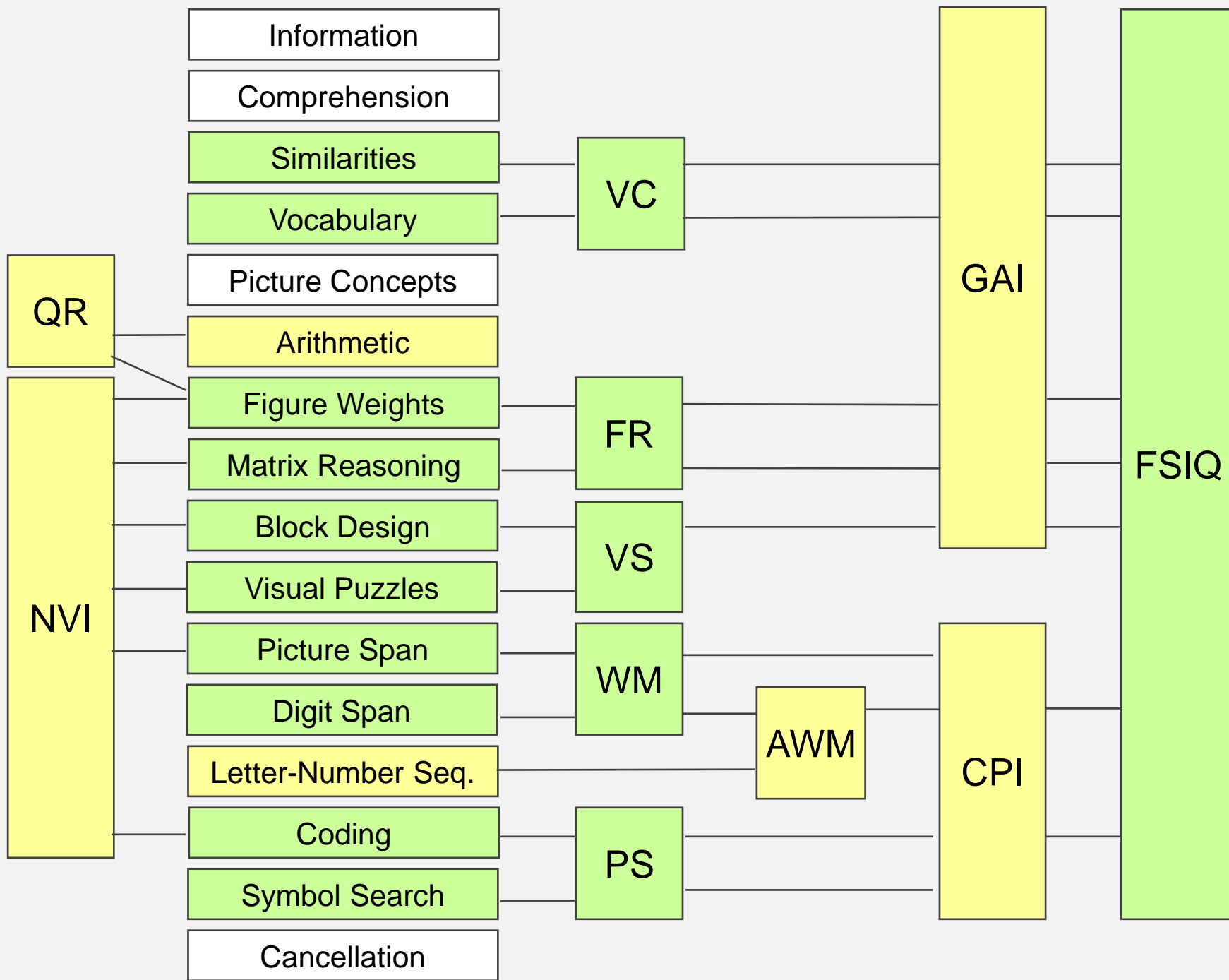
- phonology

Quantitative Reasoning Index

“The QRI...is an indicator of the child’s quantitative reasoning skills.”

Technical Manual, p.165





Expanded factors

Expanded Index Scores

Verbal (Expanded Crystallised) Index (VECI)

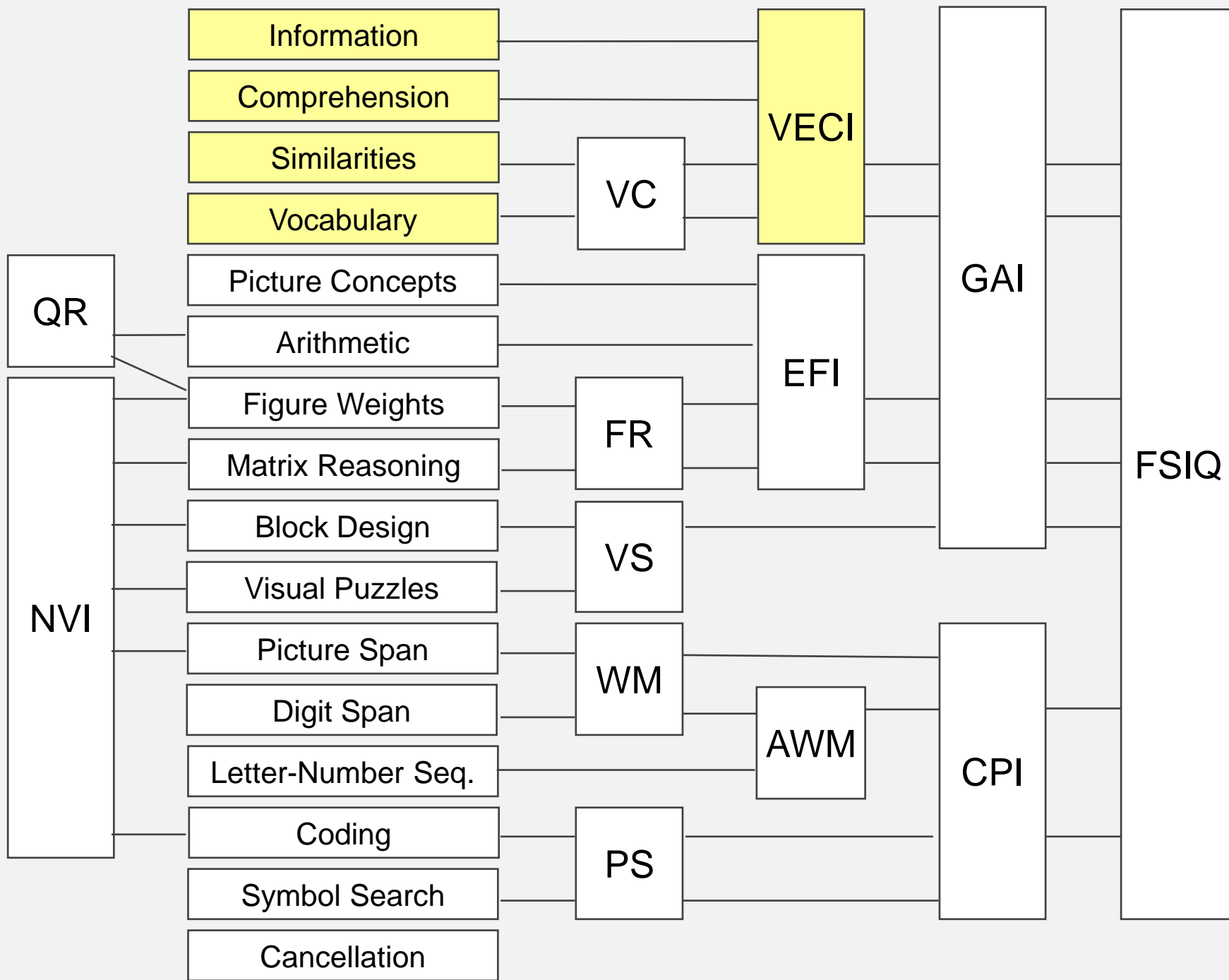
Expanded Fluid Index (EFI)

Raiford et al (2015). *WISC-V Technical Report #1 – Expanded Index Scores*.
Available at <https://www.pearsonclinical.com.au/files/373481450329565.pdf>

VECI

“The VECI provides a broad measure of the child’s ability to access and apply acquired word knowledge and general knowledge.”

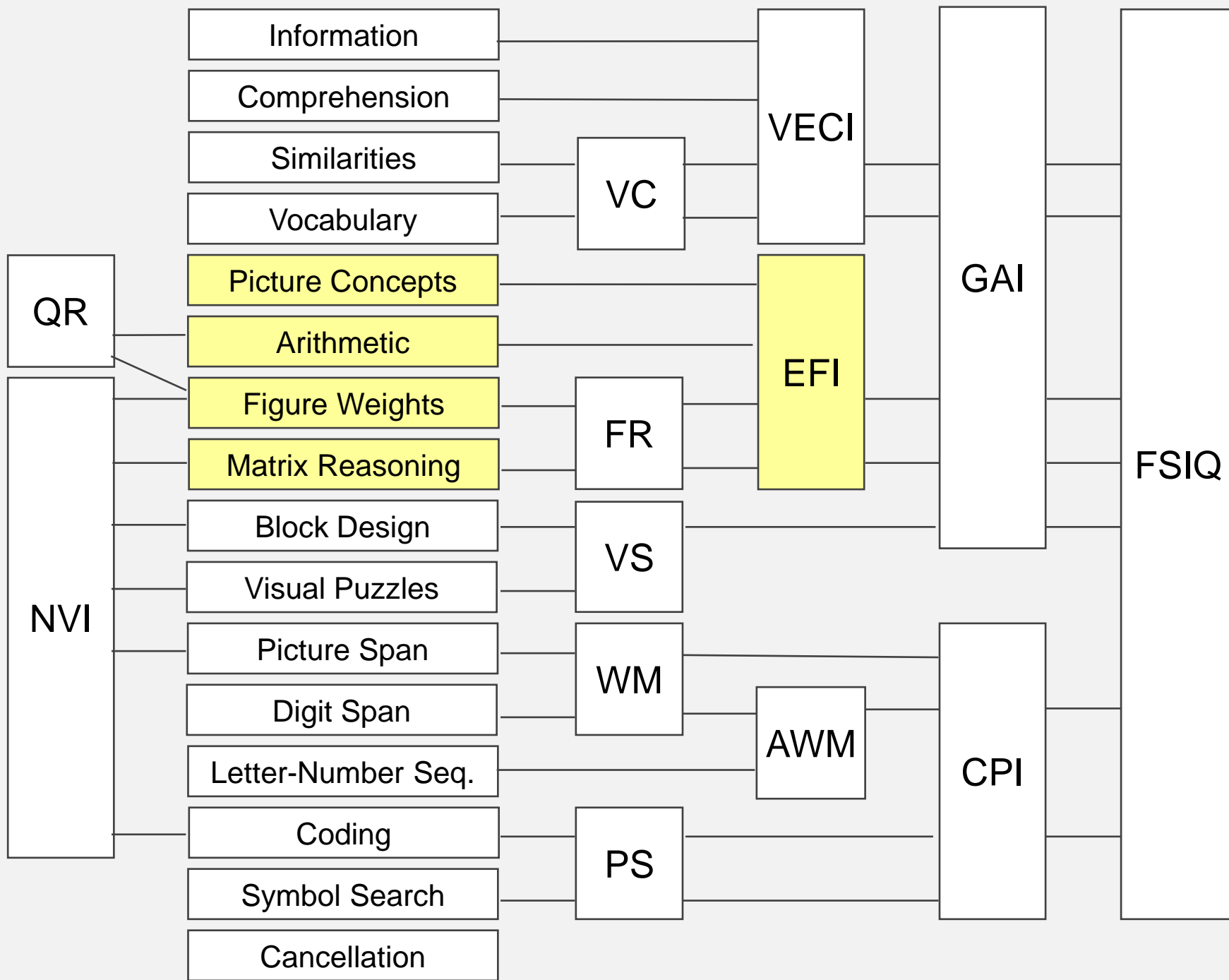
Technical Report #1, p.5



EFI

“The EFI provides a broad measure of the child’s ability to detect underlying conceptual relationships, extract important information, and use reasoning to identify and apply rules.”

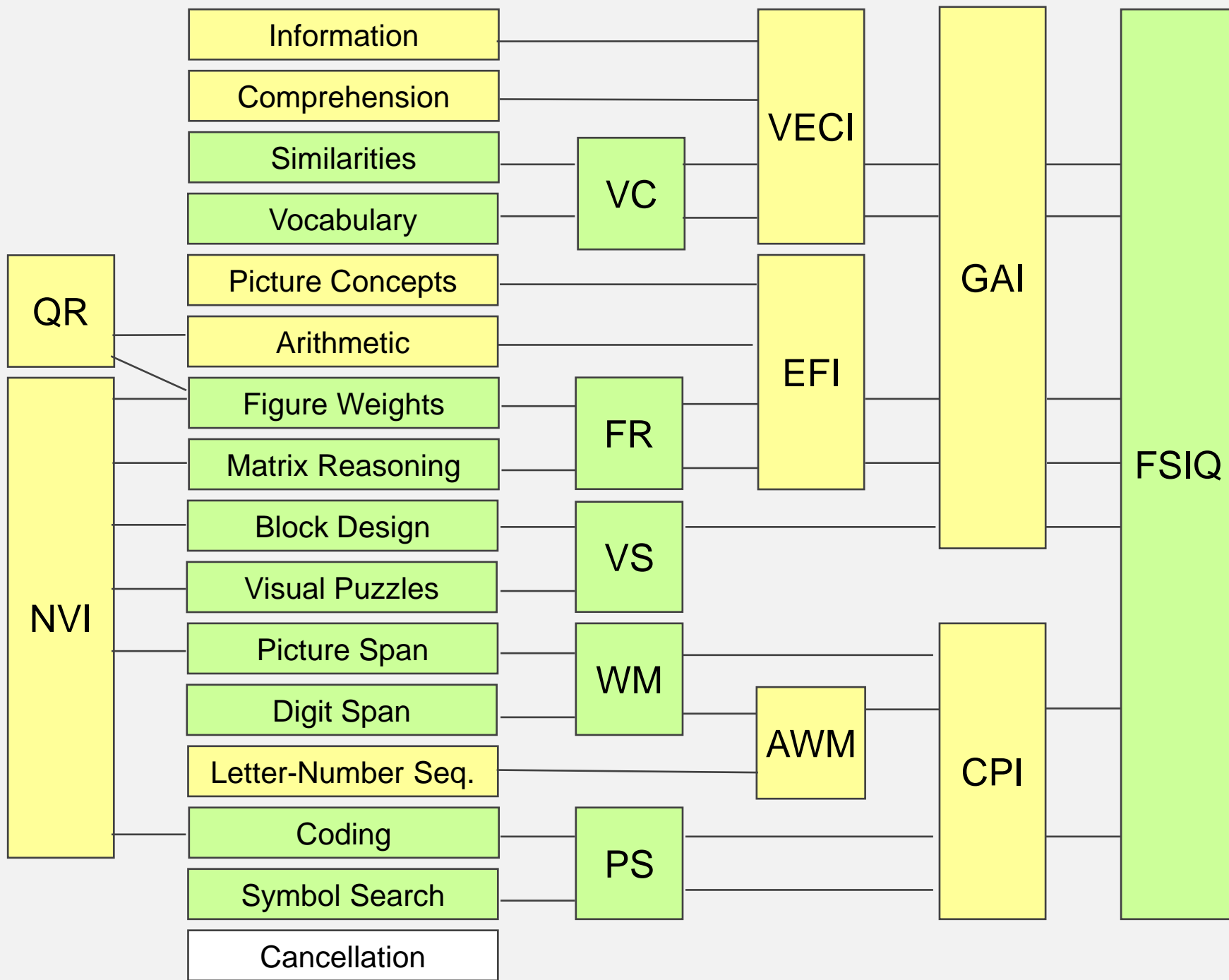
Technical Report #1, p.5



Opinion

there is insufficient evidence to make strong statements about these factors

however, it may be speculated that VECI could be a better indicator of verbal difficulties than VC alone



Complementary Index Scales

Naming Speed

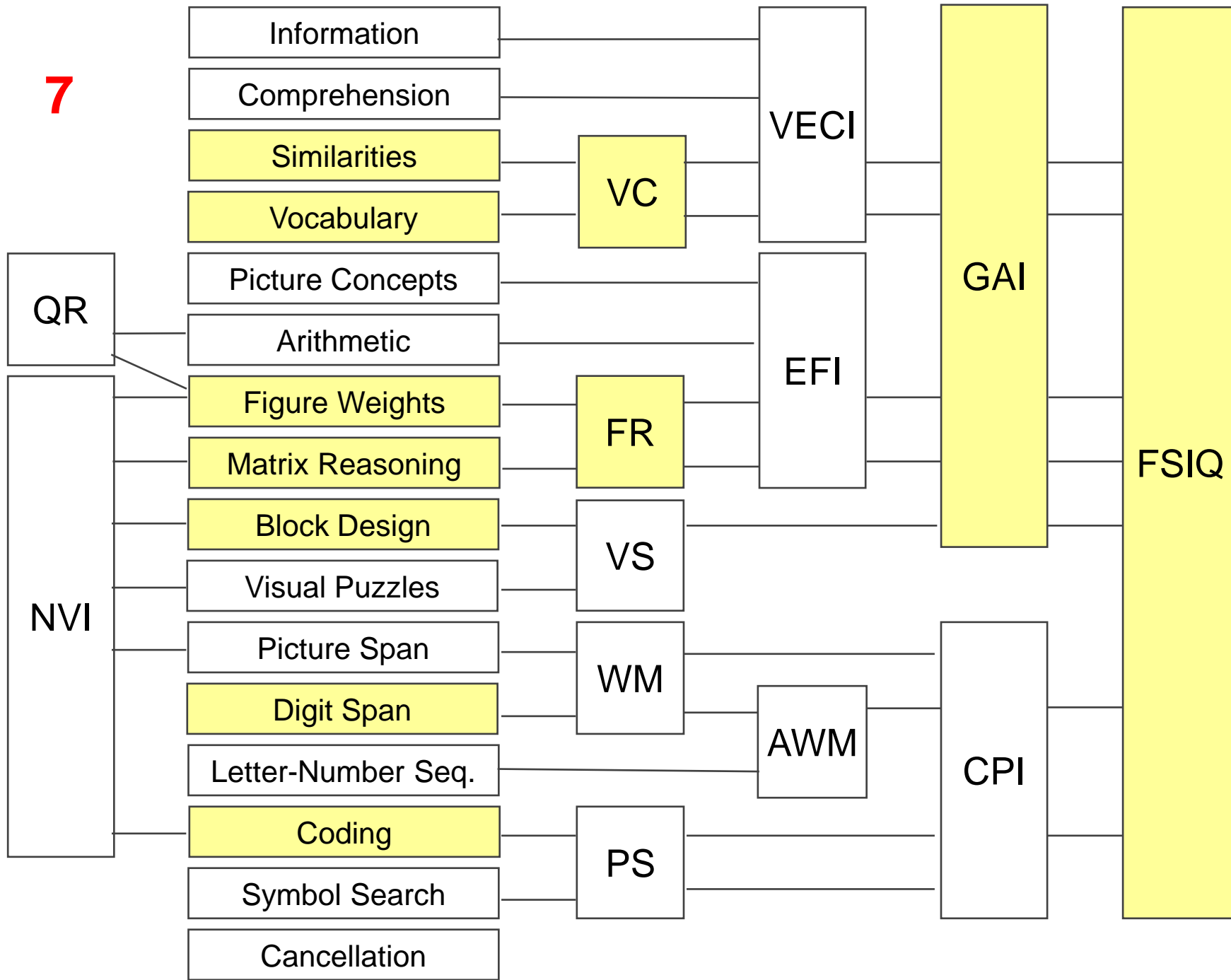
Symbol Translation

Storage and Retrieval

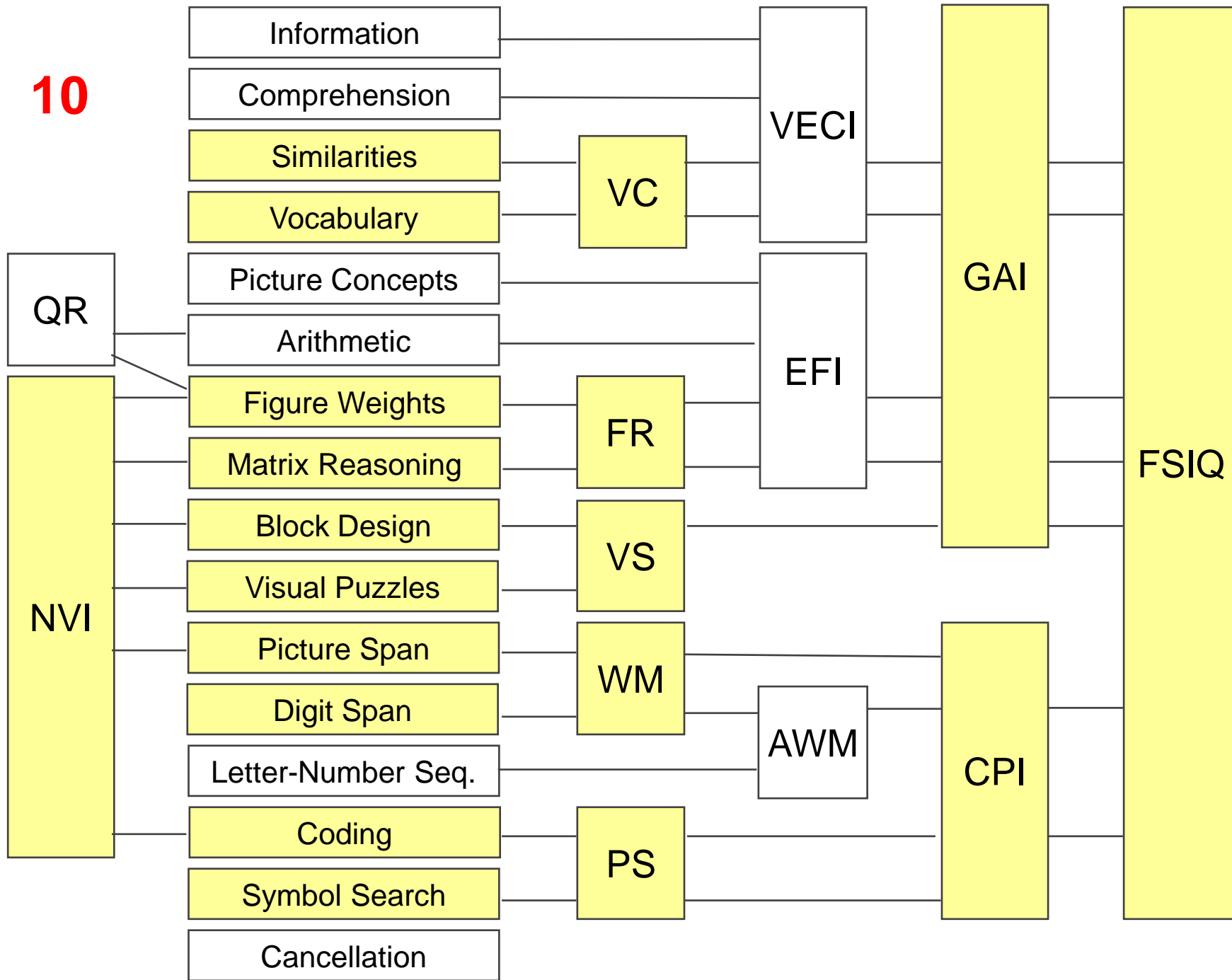
*Complementary subtests are not included in A&NZ
standardisation version*

Subtest selection

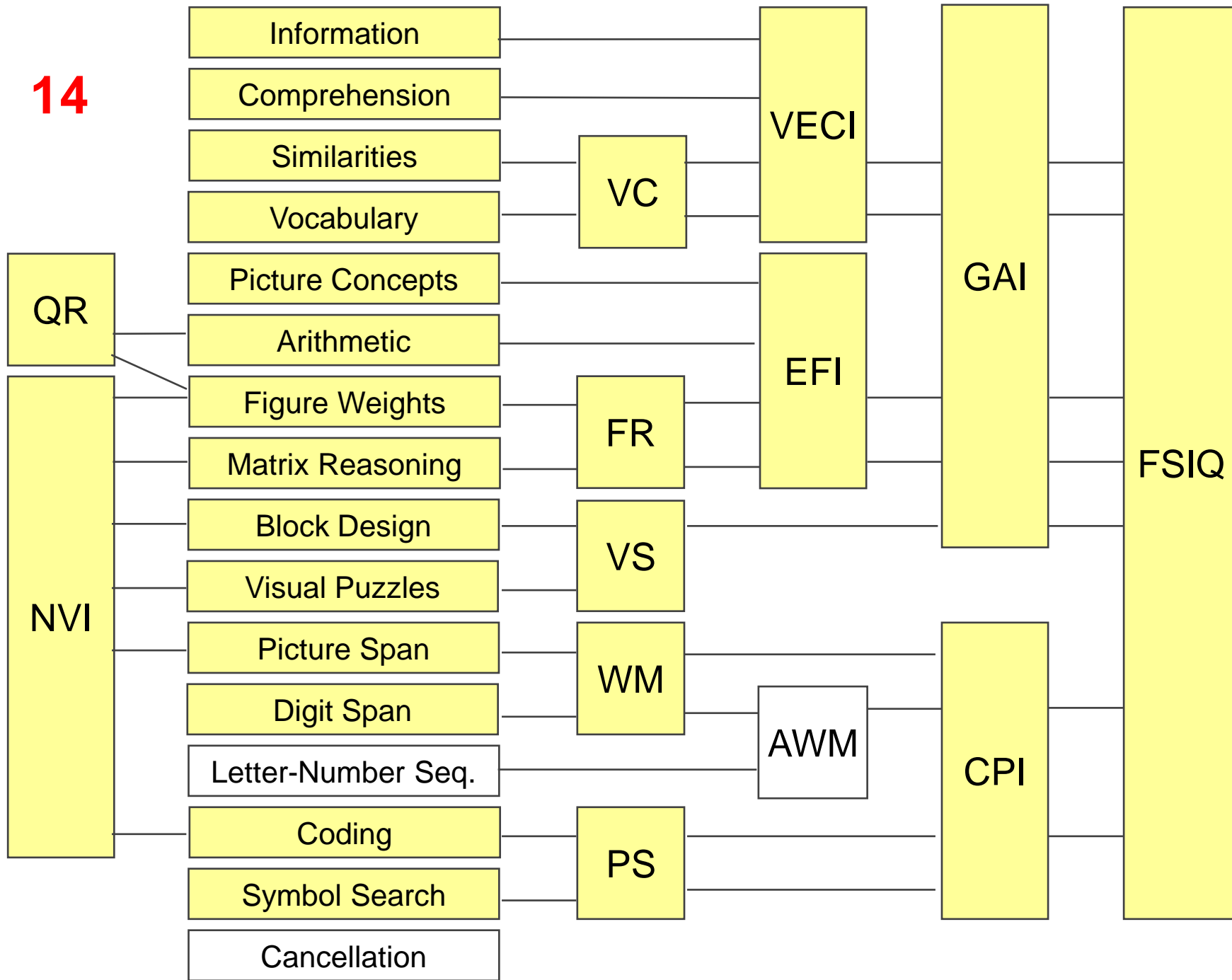
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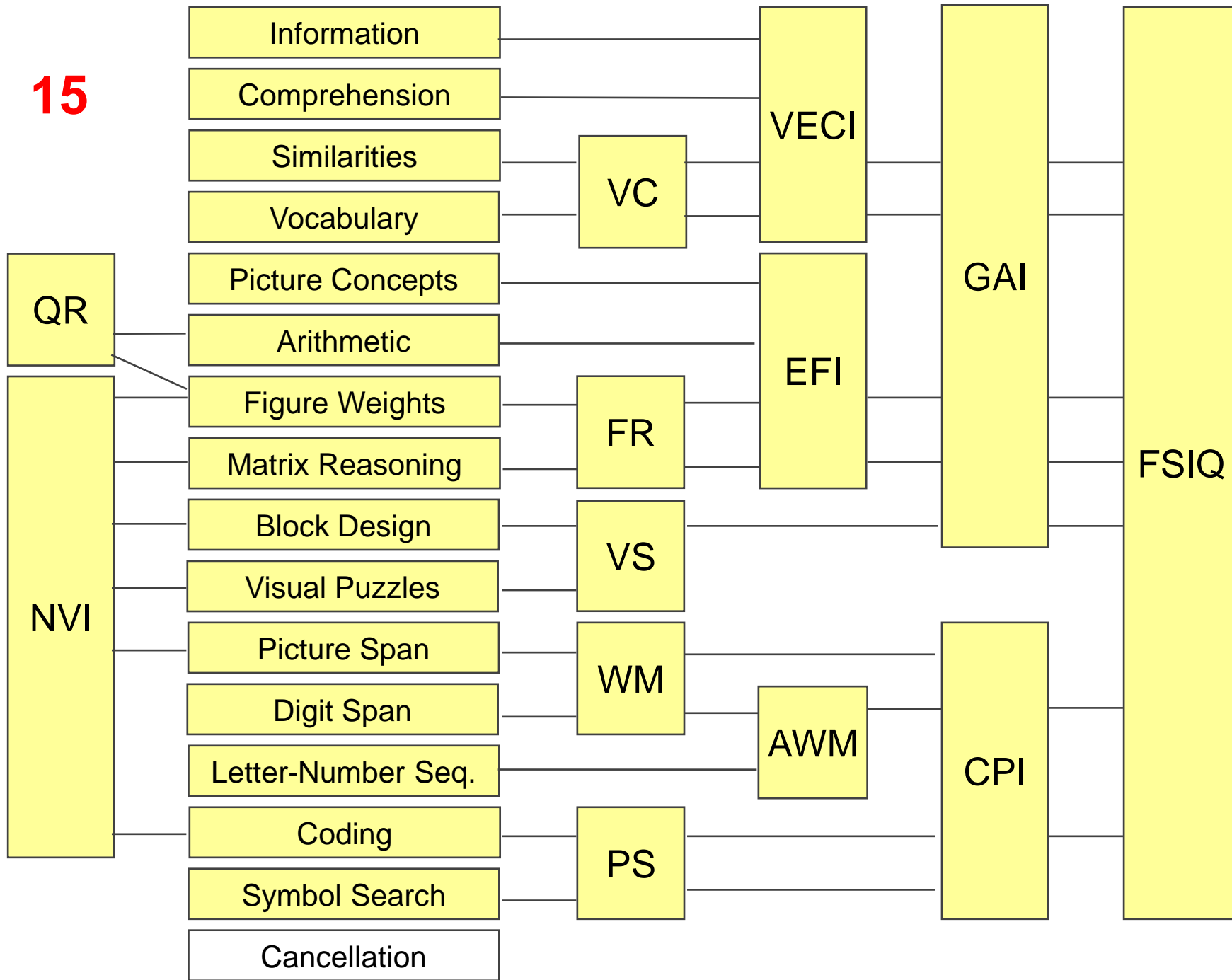
10



14

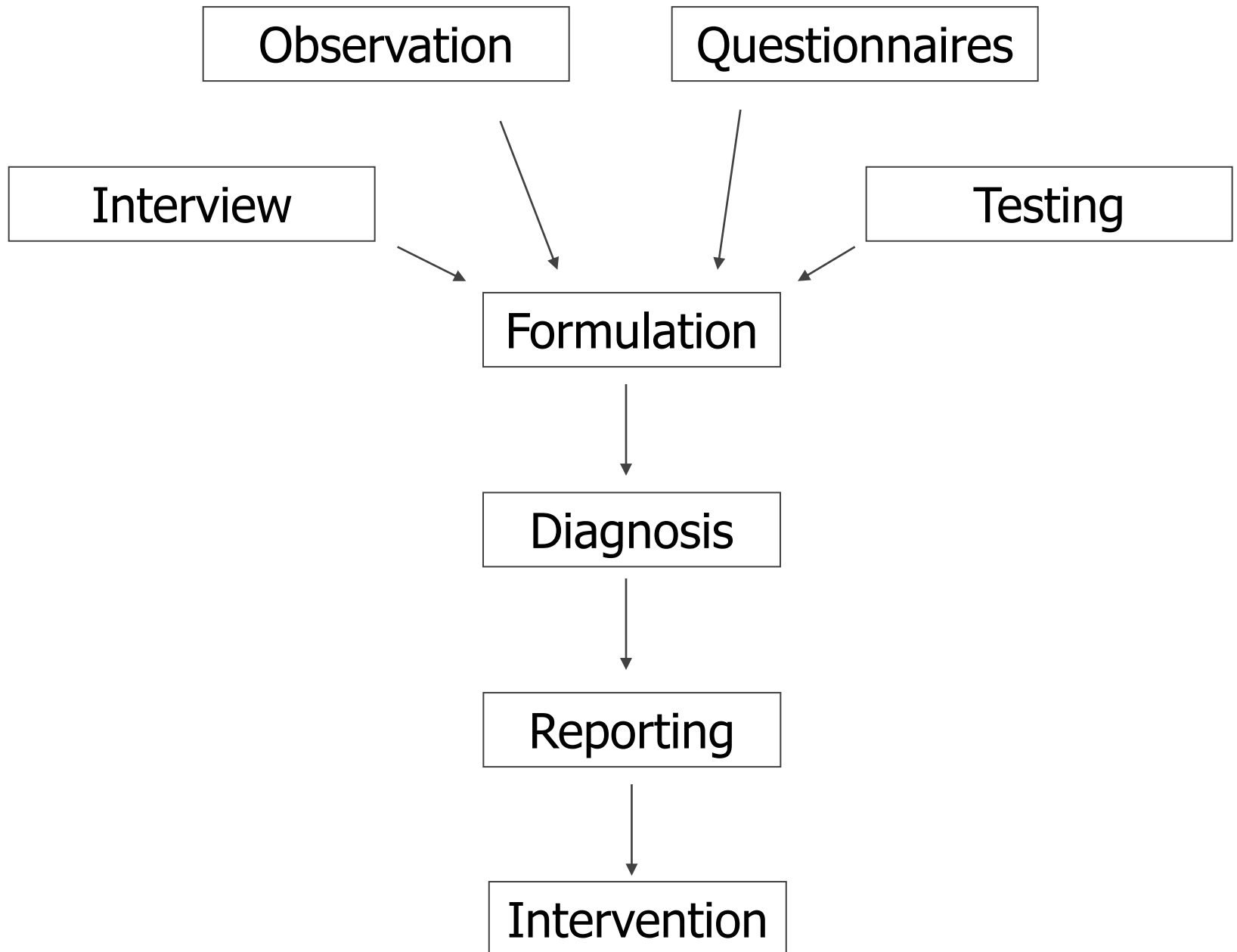


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Interpretation



Step 1 : Hypotheses

Step 1 : Hypotheses

on the basis of available information, consider

- presenting problems
- strengths and weaknesses
- background factors
- possible diagnoses
- possible formulations

Step 2 : General abilities

Step 2 : General abilities

examine FSIQ and GAI

IQ ranges

Score	Percentile	Range
≥ 130	98 - >99.9	Extremely High
120 - 129	91 - 97	Very High
111 - 119	76 - 90	High Average
90 - 110	25 - 75	Average
81 - 89	10 - 24	Low Average
71 - 80	3 - 9	Very Low
≤ 70	2 - <0.1	Extremely Low

FSIQ: Applications

intellectual disability

“low IQ” (70 - ~80)

intellectual giftedness

Analysing FSIQ

check confidence interval

compare with other estimates of intelligence

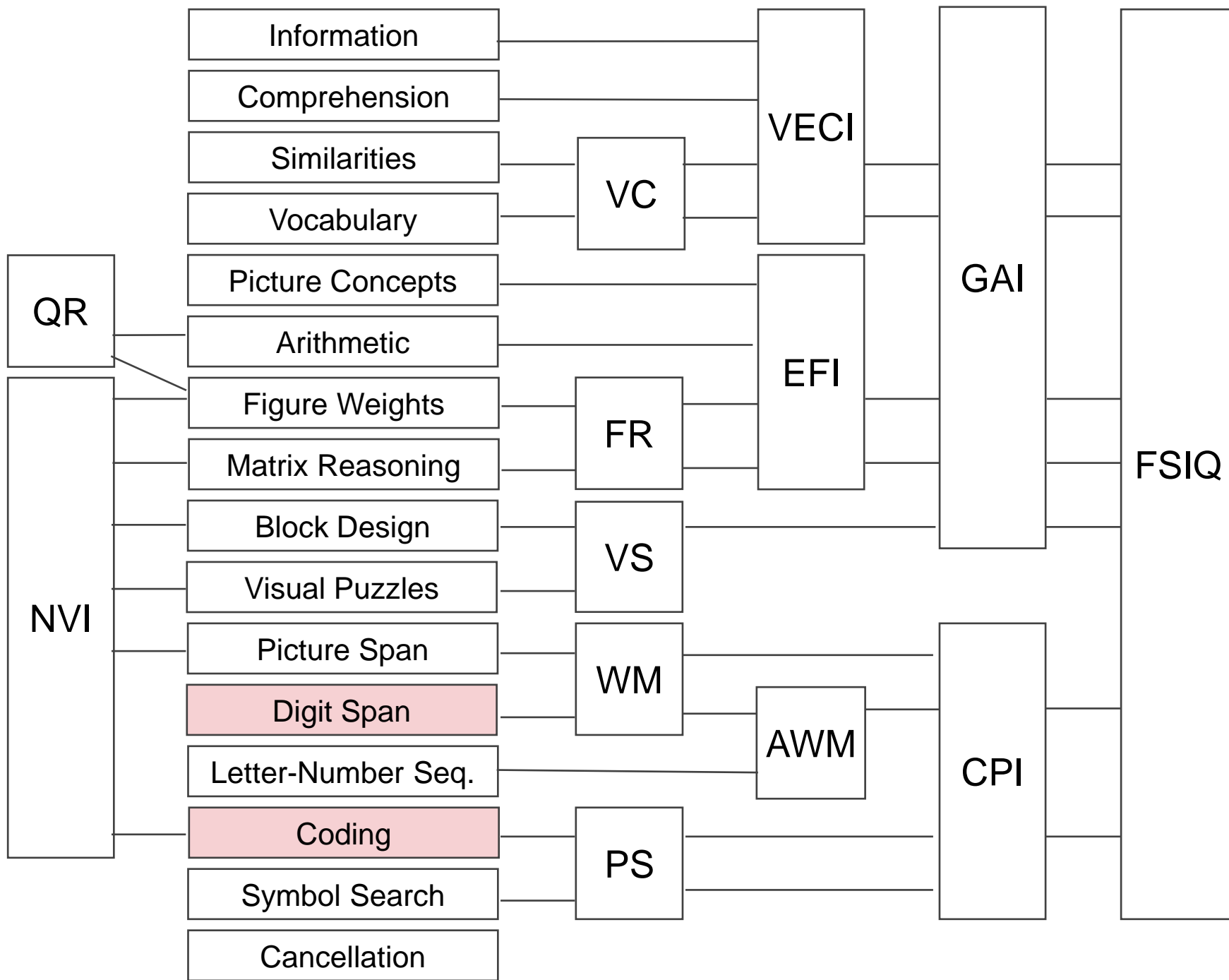
- other tests
- teacher estimates
- general functioning

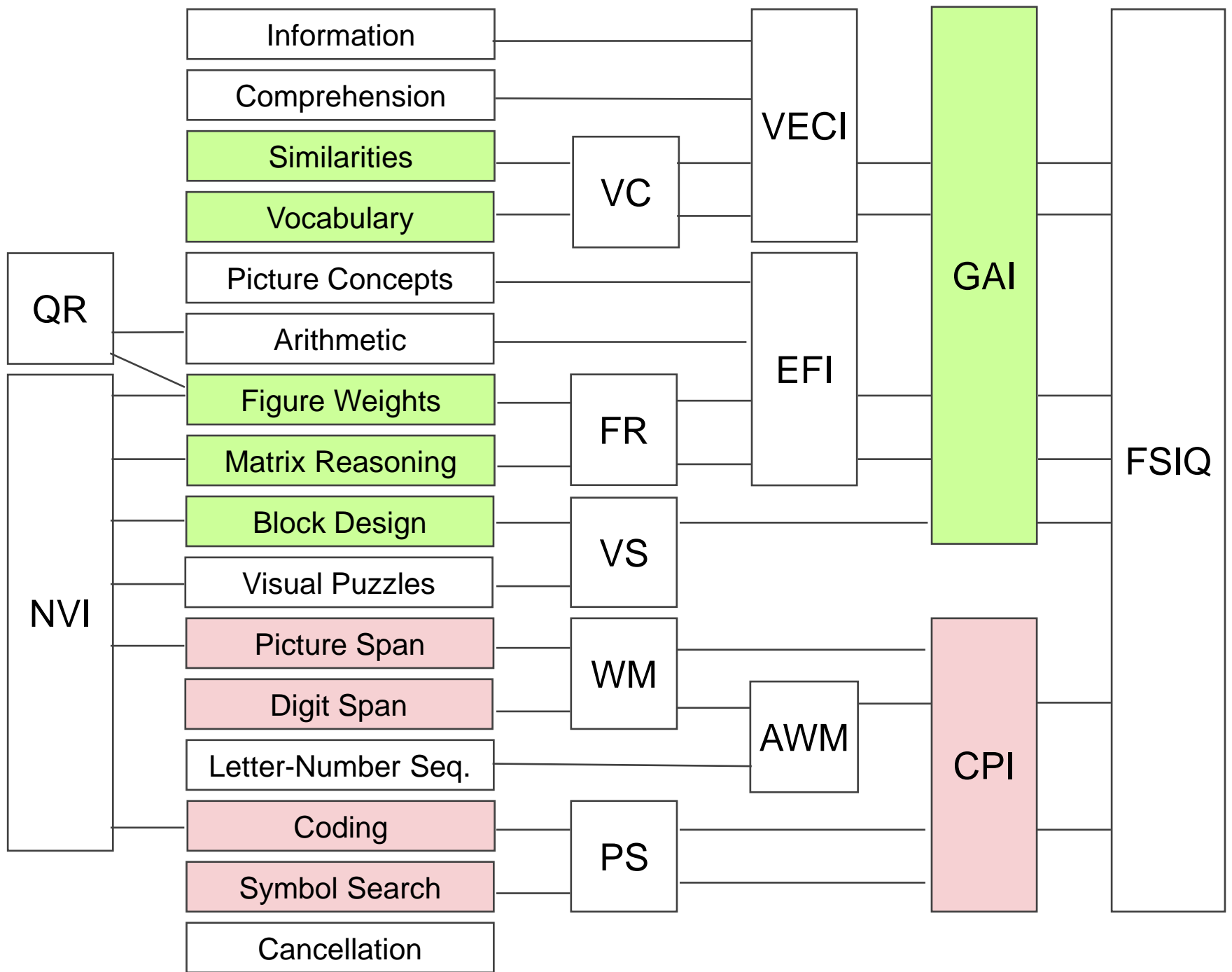
FSIQ provides an estimate of client's general intellectual abilities

FSIQ or GAI ?

FSIQ and/or GAI

the decisions whether to interpret and report FSIQ and/or GAI reflect the dilemma described above: are we seeking a broad measure of general intellectual abilities, or a specific measure of g ?





Reading disorders : Lowest subtests

Vocabulary

Similarities

Digit Span

Letter-Number Sequencing

Picture Span

NB no exclusion of language disorder

Language disorders : Lowest subtests

No special group study reported in manual

FSIQ may be less informative when...

- GAI-CPI discrepancy of 18 or more
- VCI-FRI/VSF discrepancy of 20 or more
- discrepancy between any primary factors of 24 or more

Note: none of these invalidate the FSIQ, but each suggests it may be less informative than other measures

GAI : Summary

the GAI is a narrower measure of abilities
it is not a substitute for the FSIQ, and should not
be employed in administrative decision-making
as a purer measure of g , it may better reflect the
abilities that are commonly taken to differentiate
gifted children from others

Step 3 : Factors

Step 3 : Factors

Verbal skills	WM/AWM, VC
Executive functions	FR, VS
Visuomotor skills	PS (VS)
Arithmetic skills	QR

WM & AVM

Q: does the child exhibit difficulties in phonological aspects of language?

hypotheses

- reading disorder
- language disorder

VC

Q: is there evidence of difficulties with verbal reasoning?

hypotheses

- language disorder
- dysexecutive problems

FR & VS

Q: is there evidence of difficulties with nonverbal reasoning?

hypotheses

- ADHD
- dysexecutive problems

PS

Q: is there evidence of difficulties with visual perception or simple motor skills?

hypotheses

- developmental motor disorder
- visual perception

Step 4 : Further assessment

Step 4 : Further information

test hypotheses by obtaining other
information

consider co-morbid problems

Other information

Q: is other information consistent with hypothesised diagnosis and formulation?

- history
- other tests: language, achievement, etc
- other measures: questionnaires
- other estimates: parent and teacher reports
- observation

Assessment

- Step 1 : Generate hypotheses
- Step 2 : Examine general abilities
- Step 3 : Examine factors
- Step 4 : Further assessment
- Step 5 : State diagnosis and formulation
- Step 6 : Determine interventions
- Step 7 : Feedback and report

Misstep : The subtests

*When can subtest scores
be interpreted?*

When there is:

- (1) variation from other subtests*
- (2) identification of CI*
- (3) adequate or ample specificity*
- (4) evidence of validity*

Comments on the WISC-V Technical and Interpretative Manual's “Interpretative Considerations”

“Although the implication is that profile variability and scatter are potentially clinically relevant, limited evidence is provided within the *WISC-V Technical and Interpretative Manual* to support these claims”.

Miller & McGill (2016), p.653

“the interpretation of the WISC-V...seems overly complicated, and some interpretations likely are not well supported.”

Reynolds & Hadorn (2016, p.634)

“The claim in the *WISC-V Technical and Interpretative Manual* that [Patterns of Strengths and Weaknesses analysis] models are “research-based” (p.183) is debatable...The accuracy of [three major models] was evaluated in a simulation study that found that all three failed to identify a large number of positive cases and falsely identified an even larger number of negative cases.”

Canivez & Watkins (2016), p.700

“ *“Bad usage of tests”* (Buros, 1965, p.xxiv) is exacerbated by the great number of score comparisons and analyses promoted for the WISC-V. Users should remember that *“just because the test or its scoring software produces a score, you need not interpret it”* (Kranzler & Floyd, 2013, p.95)”

Canivez & Watkins (2016), p.702

Opinion

the *WISC-V Technical and Interpretative Manual* has several significant flaws

- emphasis on “bottom-up” analysis of data
- claim that factors are valid measures of specific constructs
- proposal that interventions can be selected on basis of WISC scores

Developmental cognitive disorders and the WISC-V

Developmental cognitive disorders

intellectual disability

sensory impairments

- visual impairment
- auditory impairment

motor disorders

learning disorders

- language disorders
- reading disorders
- spelling - writing disorders
- arithmetic disorders

attention-deficit hyperactivity disorder

autistic spectrum disorders

other disorders

DSM-5 Neurodevelopmental Disorders

Intellectual disability (Intellectual Developmental Disorder)

Communication disorders

- Language disorder
- Speech sound disorder
- Childhood-onset fluency disorder
- Social (pragmatic) communication disorder

Autism spectrum disorder

Attention deficit hyperactivity disorder

Specific learning disorder

Motor disorders

- Developmental coordination disorder
- Stereotypic movement disorder
- Tic disorders

Case : Jenny

Jenny (10:2), Year 5

Jenny was referred for a psychometric assessment due to a history of reading difficulties.

fourth child of Jeff and Jill. Jenny has two older brothers (11, 14) and an older sister (18). Jenny was born in Australia and English is spoken in the home.

No complications during pregnancy

Birth at 37 weeks – no further complications

Met all developmental milestones

Jenny has had significant difficulty learning to read.

Jenny has had a significant amount of reading intervention in Year 1 through 3.

Jenny reports hating reading.

Jenny avoids homework.

Jenny has well developed social skills.

Jenny gets worried about reading aloud.

No previous assessments

Case

VCI 98

VSI 108

FRI 106

WMI 85

PSI 89

FSIQ 97

NVI 101

QRI 97

AWMI 81

CPI 84

GAI 105

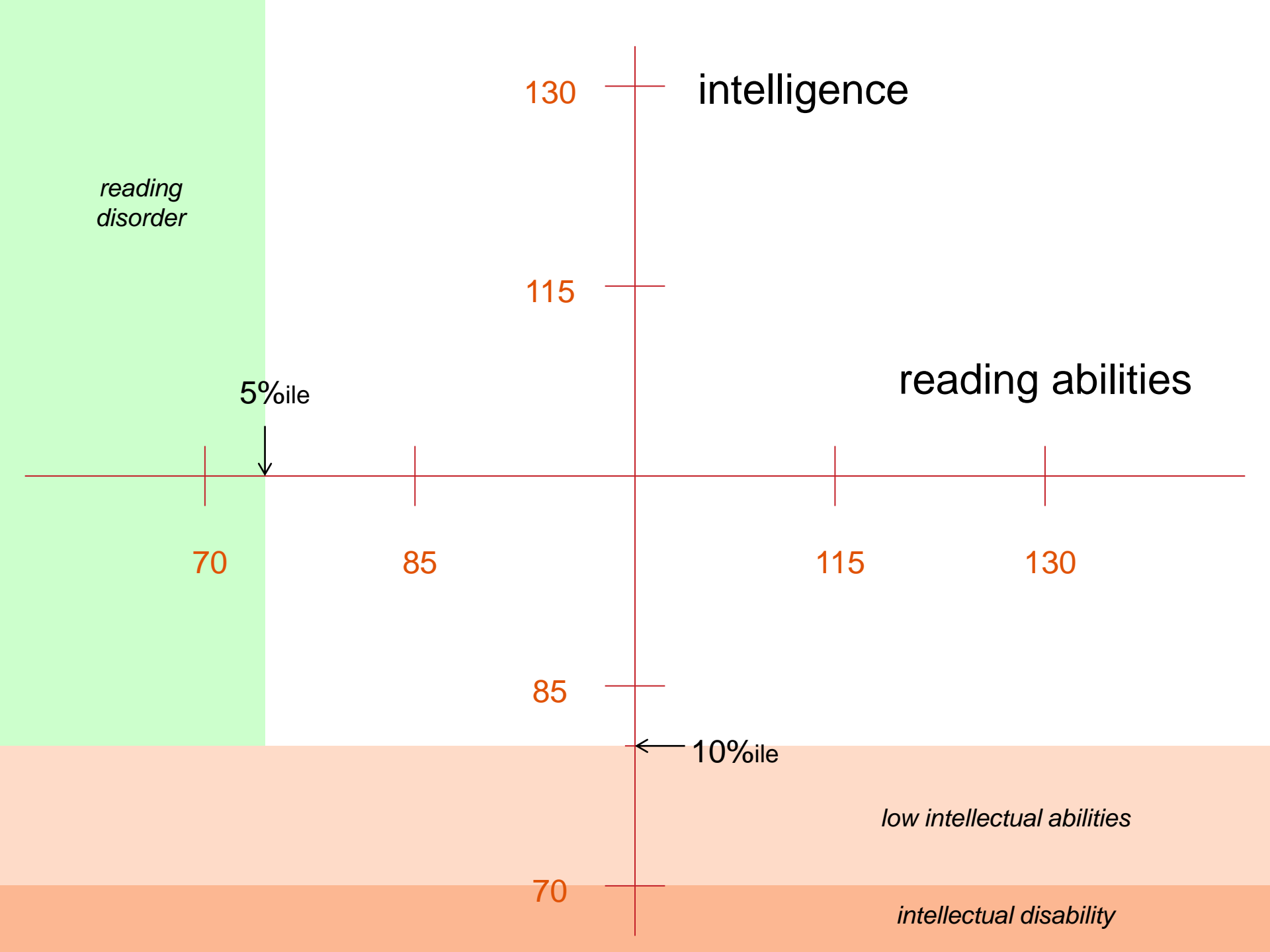
Reading disorders

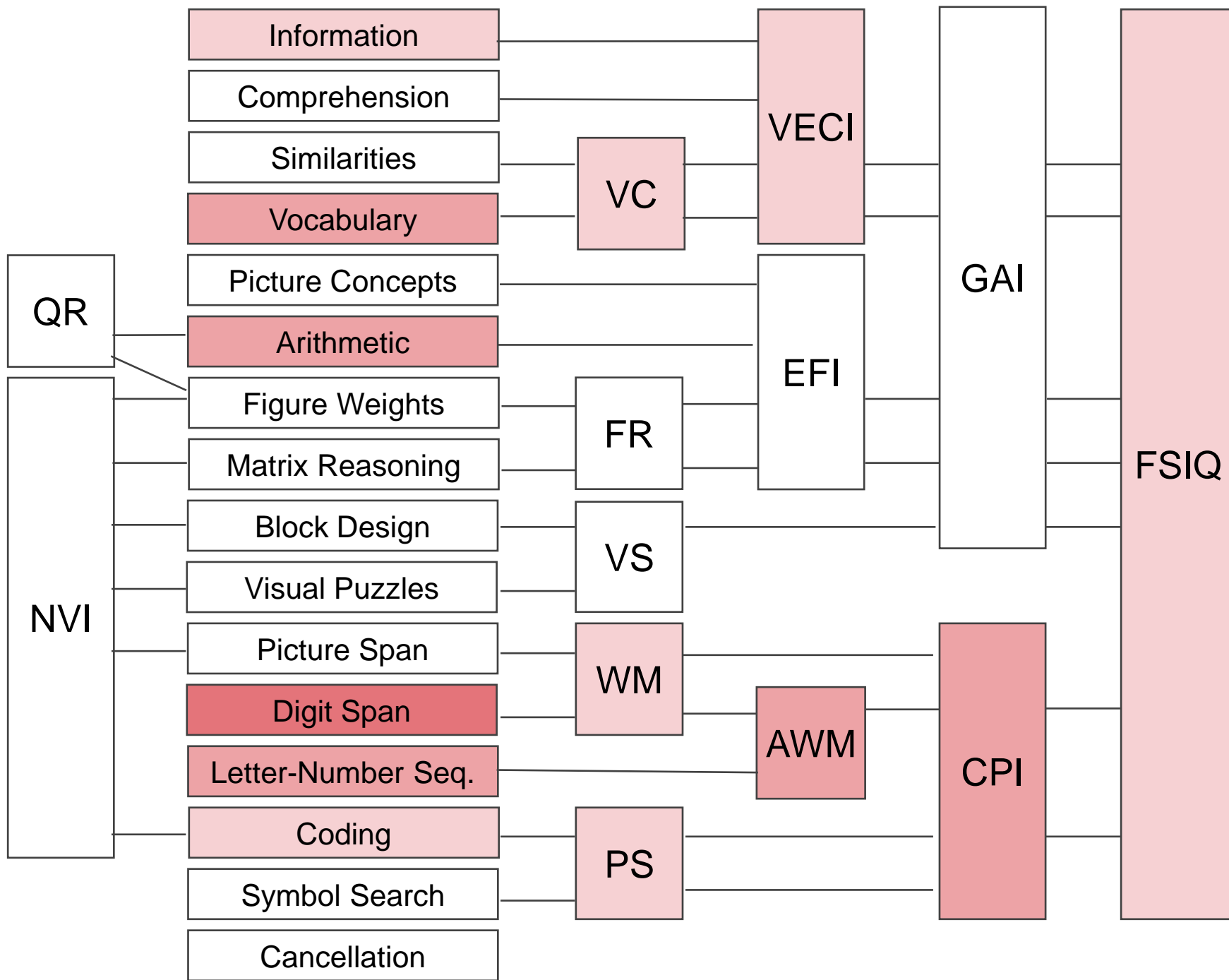
Specific reading disorder

core phonological deficit

major symptom is poor, or dysfluent
decoding

effect on development of lexicon and
comprehension of written material





Reading and WISC-V factors

Weakness

phonology

AWM / WM

semantics

VC (vocabulary/information)

Intact

grammar

VC (verbal responses)

nonverbal

FR, VS

Case : Joseph

Joseph (8:8), Year 3

referred for an assessment due to concerns raised by his school regarding his difficulty in literacy development as well as his difficulty in following instructions and being able to explain himself.

parents separated; he lives with his mother. He sees his father on a fortnightly basis for the weekend and on Wednesday nights for dinner. Joseph does not have any siblings.

Joseph was born in Australia and English is his first language.

No complications during pregnancy/ birth

Mother reports him to have been a late talker; about 3.5 years of age.

He had some delay in his social development, but no delay in motor.

Joseph has a history of difficulties with literacy development.

Joseph is a quiet and compliant, but he does not complete tasks and cannot follow instructions.

Joseph can have difficulty with his peers. He doesn't respond to them.

No previous assessments

Case - Joseph

VCI 78

VSI 102

FRI 103

WMI 82

PSI 92

FSIQ 85

NVI 97

QRI 85

AWMI 78

CPI 82

GAI 89

Language disorders

Specific language impairment

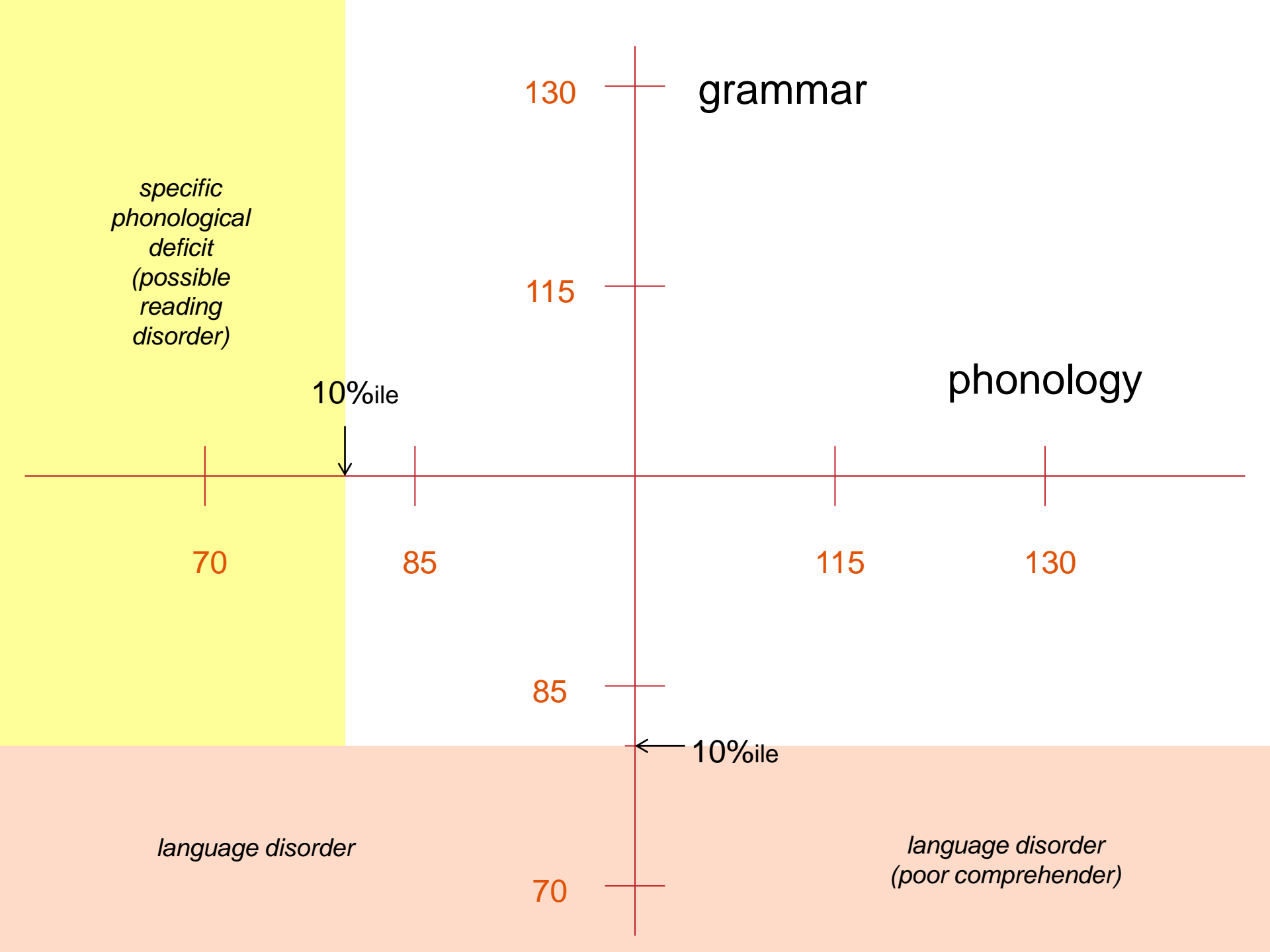
deficits in all areas of language

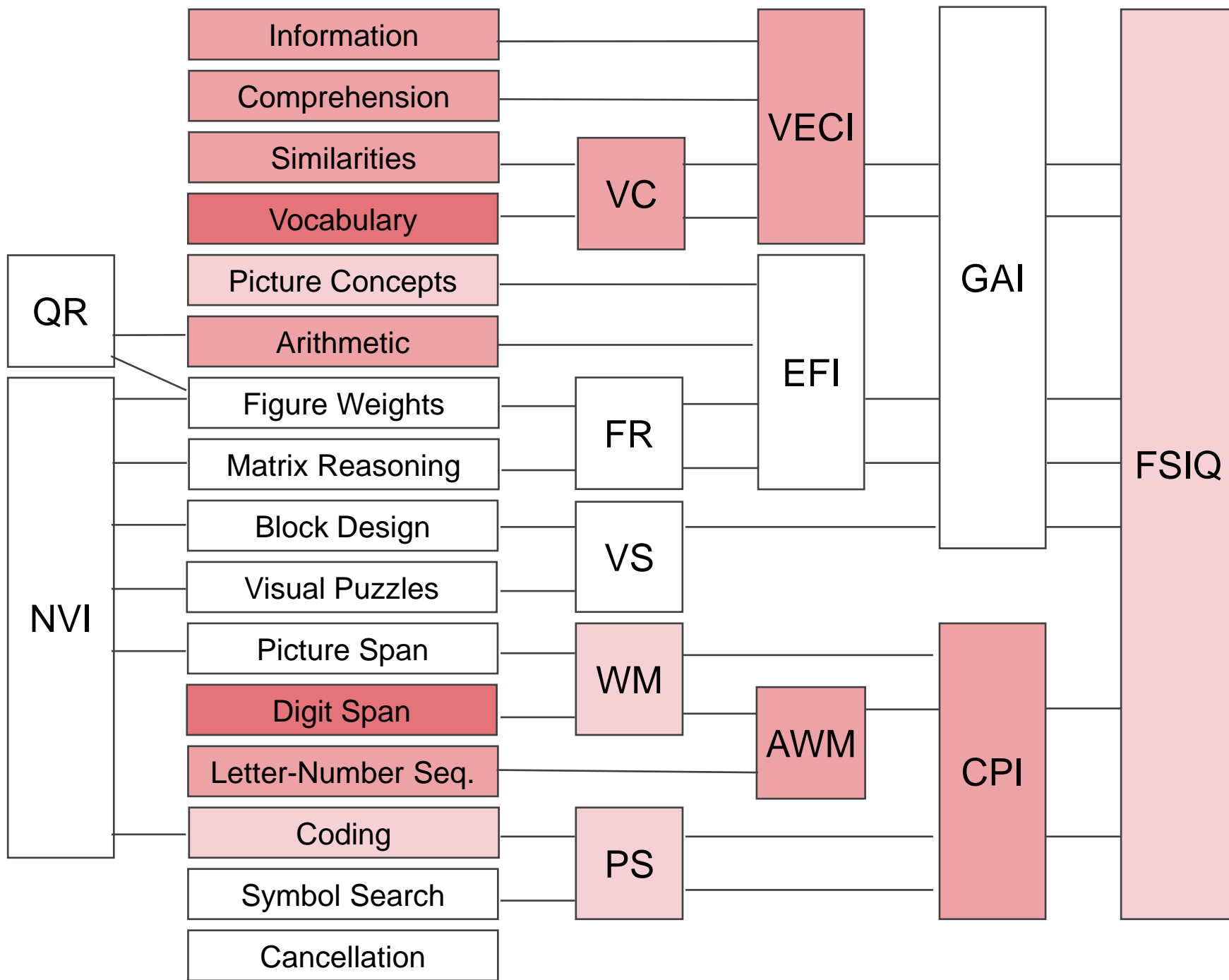
late emergence of language

protracted development

uneven pattern across areas

- common pattern of grammar < phonology < semantics & pragmatics





Language and WISC-V factors

Weakness

phonology

AWM / WM

grammar

VC (verbal responses)

semantics

VC (vocabulary/information)

Intact

nonverbal

FR, VS



Summary

Improvements

modifications to instructions

materials

discontinue rules

addition of new measures of reasoning

Concerns

inconsistent evidence for factor structure

“interpretative guidelines” encourage inappropriate and invalid assessment practices

Case : Max



Max



9 years, 7 months

Year 4

Reason for referral:

Max was referred for a psychometric assessment in order to identify the nature of his learning difficulties. Max appears to be having difficulty across all areas. He doesn't listen and can become distracted easily.

Background History:

Family

Max lives with his parents and younger sister (3). Max was born in Australia and English is spoken in the home.

Developmental History

No complications during pregnancy or birth, met developmental milestones at a slower rate than other children of the same age.

Max enjoys toys and TV shows that are for much younger children.

Max's parents are reporting that their three year old is catching up to Max.

Educational History

Max is reported to be having difficulties across all areas.

Max's parents have been reluctant to seek assessment because they believed things would just start to click for Max, but they haven't.

Social/ Emotional development

Max has a group of friends. He tends to be a follower and also enjoys playing with younger children.

Max does not have any behaviour, social, or emotional concerns.

Previous assessment

Max has not had any previous assessments.



	Composite Score	Percentile	Confidence Interval (95%)
Verbal Comprehension	65	1	60-75
Visual Spatial	67	1	62-78
Fluid Reasoning	69	2	64-78
Working Memory	69	2	64-78
Processing Speed	63	1	59-78
Full Scale	60	0.4	56-67

Case : Sally



Sally



15 years, 1 month

Year 11

Reason for referral:

Sally presented for an updated psychometric assessment in order to assist with planning for her future.

Background History:

Family

Sally lives with mother and father and two younger brothers. Sally was born in Australia and English is her first language.

Developmental History

IVF baby, No complications during pregnancy or birth

She met milestones early. She was talking in sentences at 10 months of age.

She had no delays in her motor or social development.

Educational History

Sally started school and was accelerated one grade at the beginning of Year 1 (meaning she did not complete Year 1 and went directly into Year 2).

Sally has topped her classes and continues to need acceleration in subject areas.

Sally is completing HSC English and Maths a year early.

Social/ Emotional development

Sally gets along with older peers much better than her age-matched peers. She has a tendency to be perfectionistic. She had treatment for Generalised Anxiety Disorder when she was 10.

Previous assessment

Sally was assessed using the WISC-IV when she was 6 years of age. She was found to be within the very superior range at the 99.5 percentile. In the WIAT-II she was found to be more than two years ahead of her peers and therefore she was accelerated.



	Composite Score	Percentile	Confidence Interval (95%)
Verbal Comprehension	130	98	120-135
Visual Spatial	138	99	127-143
Fluid Reasoning	131	98	122-136
Working Memory	130	98	121-135
Processing Speed	116	86	104-123
Full Scale	137	99	130-141

Case : Zac



Zac

7 years, 7 months

Year 2

Reason for referral:

Zac was referred for a psychometric assessment in order to identify his current level of intellectual functioning as he is not progressing in his reading or his maths. Zac's grandparents are concerned that he has a reading and maths disorder.

Background History:

Family

Zac lives with his grandparents; his grandparents have custody of Zac until he is 18 years of age. Zac has been living with his grandparents since he was three years of age. Zac's mother sees Zac on a fortnightly basis for a 3-hour, supervised, contact visit. Zac has never met his father. Zac does not have any siblings. Zac was removed from his mother due to her drug abuse. Zac's mother's drug use started when Zac was two years of age.

Developmental History

No complications during pregnancy or birth, Zac met developmental milestones at a slower rate than other children of the same age. For example, Zac walked at 18 months of age and started talking at two years of age.

Educational History

Zac is currently receiving reading and maths intervention in a small group setting 3 times a week, for 30 minutes at a time.

Social/ Emotional development

Zac has a great group of friends. He is able to make and maintain friendships easily. Zac plays a lot of sport, including soccer, cricket and swimming. He is reported to thrive when he is playing sport.

Zac's grandparents have worked hard to ensure Zac understands why he lives with his grandparents and not his mother. Zac is very accepting of this and has a fabulous relationship with his grandparents. Zac is not presenting with any anxiety, behavioural, or mood-related difficulties.

Previous assessment Copyright Healthy Minds

Zac has not had any previous assessments. Happy Kids 2015





	Composite Score	Percentile	Confidence Interval (95%)
Verbal Comprehension	86	18	79-95
Visual Spatial	78	7	72-88
Fluid Reasoning	82	12	76-90
Working Memory	82	12	76-90
Processing Speed	83	13	76-95
Full Scale	79	8	74-85

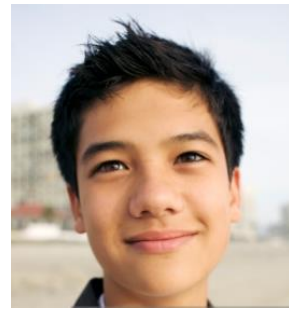


Leo

Leo

13 years, 6 months

Year 8



Reason for referral:

Leo was referred for a psychometric assessment due to his parents concerns that he is not reaching his full potential.

Background History:

Family

Leo is the second born child. He lives with his parents and his older brother (19). Leo's older brother is studying Medicine at University and his father is a doctor.

Developmental History

No complications during pregnancy or birth, Met all developmental milestones at the appropriate ages

Educational History

Leo is reported to be a 'C' student

Leo reports that his parents have really high expectations of him.

Leo reports trying hard but not being able to achieve.

Social/ Emotional development

Leo has friends at school and likes to play video games with them online.

Leo is an easy-going child who doesn't worry about anything.

Previous assessment

No previous assessments. Leo attends tutoring for Maths, English and Science. Leo reports not enjoying tutoring.

	Composite Score	Percentile	Confidence Interval (95%)
Verbal Comprehension	103	58	95-110
Visual Spatial	117	87	107-123
Fluid Reasoning	109	73	101-116
Working Memory	107	68	100-113
Processing Speed	103	58	93-112
Full Scale	105	63	99-110



Maddy

Maddy



6 years, 11 months

Year 1

Reason for referral:

Maddy was referred for a psychometric assessment in order to identify her current level of intellectual functioning to support her current school placement.

Background History:

Family

Maddy is the second born child. She has an older brother (8) and a younger brother (4). Maddy lives with her father and grandparents. Maddy's mother died two years ago from cancer.

Developmental History

No complications during pregnancy and birth

Maddy was delayed in her development across all areas.

Maddy uses two word sentences.

She was toilet-trained at 6 years of age with the help from her school.

Educational History

Maddy is currently in a support unit for children with moderate intellectual abilities.

Maddy has an individuated learning program and is showing gains in her self-care and her academic skills. She can now tell you the letters in her name.

Social/ Emotional development

Maddy is very affectionate and loving. At times she can be overly friendly to people she doesn't know well.

Maddy can have extreme emotions when things don't go the way she would like them to go.

Previous assessment

Maddy was assessed at 2 years of age and found to have a global developmental delay. At four years of age she was reassessed and found to have a moderate intellectual disability.

Maddy has had a range of intervention including behaviour support for her family. She has also had support to understand and grieve the loss of her mother.



	Composite Score	Percentile	Confidence Interval (95%)
Verbal Comprehension	59	0.3	55-70
Visual Spatial	49	0.1	46-62
Fluid Reasoning	55	0.1	51-65
Working Memory	51	0.1	47-61
Processing Speed	53	0.1	50-69
Full Scale	46	<0.1	43-54

Specific Learning Disorder

- A. Difficulties learning and using academic skills, as indicated by the presence of at least one of the following symptoms that have persisted for at least 6 months, despite the provision of interventions that target those difficulties:

1. Inaccurate or slow and effortful word reading (e.g., reads single words aloud incorrectly or slowly and hesitantly, frequently guesses words, has difficulty sounding out words).
2. Difficulty understanding the meaning of what is read (e.g., may read text accurately but not understand the sequence, relationships, inferences, or deeper meanings of what is read)

3. Difficulties with spelling (e.g., may add, omit, or substitute vowels or consonants)
4. Difficulties with written expression (e.g., makes multiple grammatical or punctuation errors within sentences; employs poor paragraph organisation; written expression of ideas lacks clarity).

5. Difficulties mastering number series, number facts, or calculation (e.g., has poor understanding of numbers, their magnitude, and relationships; counts on fingers to add single-digit numbers instead of recalling the math fact as peers do; gets lost in the midst of arithmetic computation and may switch procedures)
6. Difficulties with mathematical reasoning (e.g., has severe difficulty applying mathematical concepts, facts, or procedures to solve quantitative problems).

B. The affected academic skills are substantially and quantifiably below those expected for the individual's chronological age, and cause significant interference with academic or occupational performance, or with activities or daily living, as confirmed by individually administered standardized achievement measures and comprehensive clinical assessment. For individuals age 17 years and older, a documented history of impairing learning difficulties may be substituted for the standardized assessment.

C. The learning difficulties began during school-age years but may not become fully manifest until the demands for those affected academic skills exceed the individual's limited capacities (e.g., as in timed tests, reading or writing lengthy complex reports for a tight deadline, excessively heavy academic loads).

D. The learning difficulties are not better accounted for by intellectual disabilities, uncorrected visual or auditory acuity, other mental or neurological disorders, psychosocial adversity, lack of proficiency in the language or academic instruction, or inadequate educational instruction.

With impairment in reading

Word reading accuracy

Reading rate or fluency

Reading comprehension

DSM-5 Language Disorder

- A. Persistent difficulties in the acquisition and use of language across modalities (i.e., spoken, written, sign language, or other) due to deficits in comprehension or production that include the following:
1. Reduced vocabulary (word knowledge and use).
 2. Limited sentence structure (ability to put words and word endings together to form sentences based on the rules of grammar and morphology).
 3. Impairments in discourse (ability to use vocabulary and connect sentences to explain or describe a topic or series of events or have a conversation).

B. Language abilities are substantially and quantifiably below those expected for age, resulting in functional limitations in effective communication, social participation, academic achievement, or occupational performance, individually or in any combination.

- C. Onset of symptoms is in the early developmental period.
- D. The difficulties are not attributable to hearing or other sensory impairment, motor dysfunction, or another medical or neurological condition and are not better explained by intellectual disability (intellectual developmental disorder) or global developmental delay.

Consensus definition

- language test score below criterion (eg ~81 on standardised test, ie 1.25 standard deviations)
- evidence of normal or near-normal abilities in other areas (eg >85 of “nonverbal IQ”)
- normal hearing (can detect pure tones at 20 decibels in each ear at frequencies 500, 1000, 2000, 4000 Hz)
- no evidence of neurological damage (ABI, epilepsy etc)
- no abnormality of oral structure or function
- no evidence of ASD

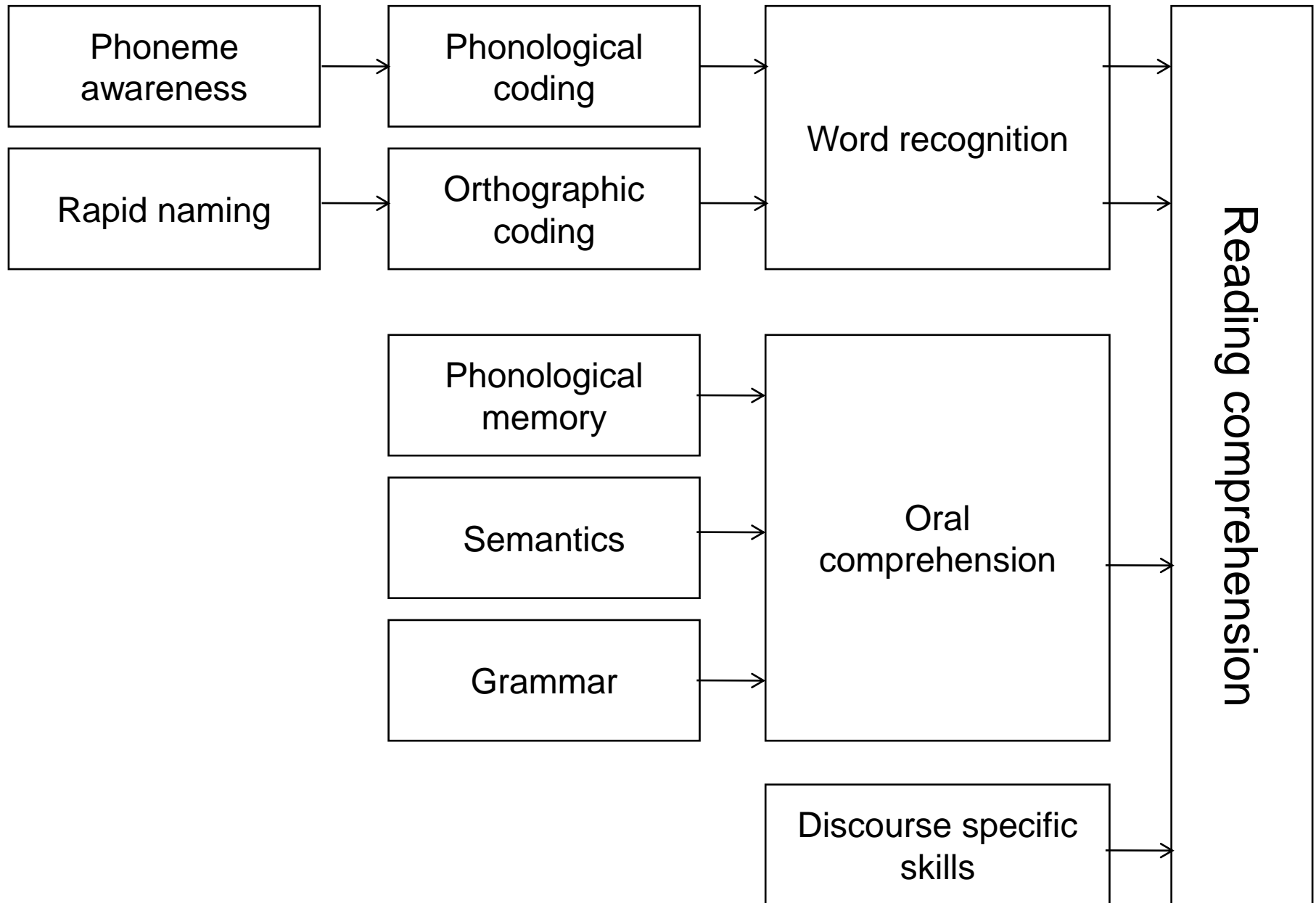
Definitions

“slow, limited or otherwise faulty development of language in children who do not otherwise give evidence of gross neurological or psychiatric disability, and where the language difficulty is not secondary to deafness”

Zangwill (1978)

“language development ... below age level, for no apparent cause”

Bishop (1997)



Cattell-Horn-Carroll model

Gv	visuo-spatial
Ga	auditory thinking
Gc	comprehension-knowledge
Gsm	short-term acquisition and retrieval
Glr	long-term acquisition and retrieval
Gf	fluid reasoning (executive)
Gs	cognitive processing speed
Gt	correct decision speed
Grw	reading-writing
Gq	quantitative

The primary factors

Case : Jenny

Case – Jenny

Case

VCI 98

VSI 108

FRI 106

WMI 85

PSI 89

FSIQ 97

NVI 101

QRI 97

AWMI 81

CPI 84

GAI 105